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IRRIGATION AND ITS PRACTICE.

(Concluded.)

VII. THE ESTABLISHMENT AND MANAGEMENT OF IRRIGATED GRASS PASTURES.

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AS has been stated, lucerne is one of the most important forage crops in Central Otago, and for the production of a high-class cured hay it cannot be excelled. On account, however, of its tendency to bloat stock it must be regarded as unsatisfactory in general as a pasture crop. Very little cured hay is used for feeding cattle or sheep during the summer months, as the farmer looks for grass pastures to supply the bulk of the summer feed. The average irrigator usually keeps, in addition to his dairy cows and horses, a small flock of sheep, and where such is the case good irrigated pastures undoubtedly are a most valuable asset. Central Otago is ideally adapted to the growing of pasture grasses and clovers. There, with an abundance of water coupled with soil low in lime requirement, and the presence of almost continuous sunshine, conditions are ideal for the establishment of first-class pastures.

For fattening purposes or the production of milk a well-designed pasture containing a proper proportion of clover and grasses in its composition is unsurpassable. Such pastures fit excellently into any

system of crop-rotation, and are very effective in building up and maintaining the fertility of the soil. As has already been mentioned, some of the soils in Central Otago are low in organic matter or humus, and in such cases by growing grass for several years and depasturing stock thereon the ground will be considerably benefited, thus paving the way for further crops demanding a higher state of fertility. Sufficient has been stated to show that the pasture is to be recognized as the most valuable asset that can be grown by the irrigator, and every effort should be expended in having more than half his farm laid down in this crop.

As a crop, pasture is probably the least understood and most maltreated. Insufficient attention is given to the adaptability or otherwise of certain grasses and clover to soil and climatic conditions. The writers have examined many irrigated pastures, and have interrogated the owners in regard to their method of establishment, mixtures used, and subsequent treatment; and sufficient indication has been obtained showing clearly the need for a brief account being given of the lines along which pastures should be laid down in Central Otago.

LAND SUITABLE FOR PASTURE.

The best pastures will be obtained from the richest ground. It is quite wrong to assume that only the poorer pieces of land unsuitable for general cropping should be utilized for growing pastures. In many cases, however, on account of the steepness of land or its undulating nature, it may be regarded as the most economical proposition to use such types of ground for growing grass. Every farm has its piece of land which might be regarded as waste on account either of its low-lying, underdrained condition or stony nature. Such pieces of land if sown with suitable grasses can readily be brought to a comparatively high state of production. Many cases have been noted where farmers have devoted the bulk of their best land to the production of hay and commercial crops, and have relegated to their pastures the small remaining portion of poorer ground. In such cases it invariably follows that there is a lack of summer feed and a surplus of winter hay, this pointing to bad regulation of their cropping system. Indications have already been given of the opinion of the writers that as little hay should be grown as possible, sufficient only being conserved for the winter feeding of the farm stock. In view of the fact that the life of permanent-grass pastures will be extended over many years, it is advisable to have them conveniently located. Again, the fact that they require frequent irrigations should be borne in mind, and on this account they should be located where irrigation can be readily and easily carried out.

SUITABLE MIXTURES.

In laying down grass pastures the aim should be to obtain a judicious mixture of grass and clovers in such a proportion as to produce a palatable sole of grass with a high feeding-value. It is to be recognized that there is no single variety of grass having all the characteristics that are looked for in an irrigated pasture. A mixture of several varieties of grasses and clovers is usually desirable, and gives better results than any single variety sown alone. The different grasses

have varying times of maximum growth, and since with the aid of irrigation the pasture can be maintained in good growing-condition through the entire irrigation season it is quite necessary that a mixture should be sown containing some early-, medium-, and late-growing varieties.

In Central Otago perennial rye-grass, Poa pratensis, alsike clover, and white clover grow exceptionally well, and every permanent pasture should certainly contain a proportion of these plants. For ordinary conditions such as exist generally in Central Otago the following mixture is likely to prove highly satisfactory: Perennial rye-grass, 14 lb.; cocksfoot, 6 lb.; timothy, 4 lb; Poa pratensis, 2 lb.; alsike clover, 2 lb.; white clover, 1 lb.: total, 29 lb. per acre.

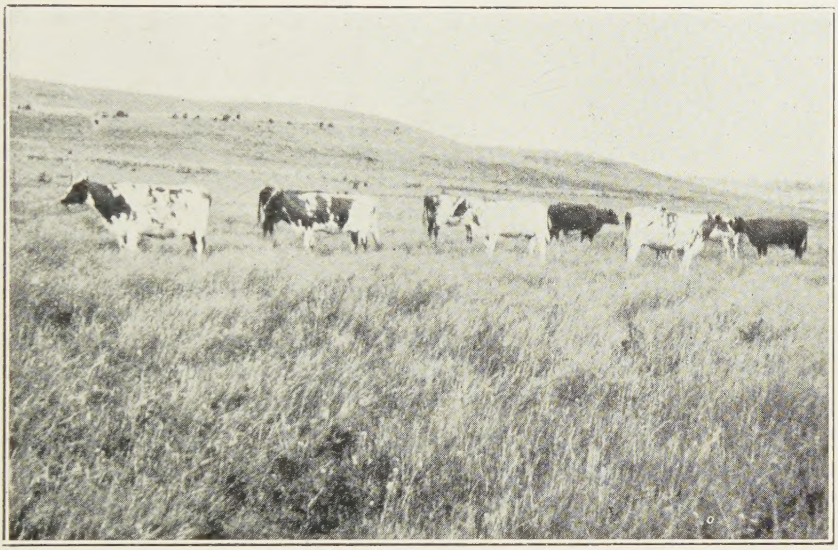

FIG. 59. AYRSHIRE AND RED POLL DAIRY CATTLE ON IRRIGATED GRASS PASTURE AT GALLOWAY IRRIGATION FARM, CENTRAL OTAGO.

Where a more simple mixture is required for sowing on rough sidelings the following can be used with satisfactory results: Perennial rye-grass, 16 lb.; cocksfoot, 6 lb.; alsike, 2 lb.: total, 24 lb. per acre.

Where it is intended only to sow down a temporary pasture under irrigation, with the idea of breaking it up at the expiry of the season following sowing, the following mixture is quite suitable: Italian rye-grass, 18 lb.; alsike, 4 lb.: total, 22 lb. per acre.

It is to be remembered that in these suggested mixtures the weights of seed given are not intended to be adhered to in every circumstance, but should act as a guide in regard to the proportions of different grasses and clovers to be used. Preference is given to the use of alsike rather than red clover in the mixtures on account of there being less likelihood of its causing bloat than the latter, and the fact that when autumn-sown it grows much better than red clover. Under Central

Otago conditions white clover appears to grow without seeding in many localities whenever water is applied to the soil. Where such is the case there is little need to use white-clover seed in the mixture.

SOWING.

As with lucerne, a good seed-bed will give the most satisfactory results, and neglect of this has often resulted in many unsatisfactory soles of grass being obtained. The aim should be to obtain a seed-bed with the soil fine, firm, and moist, as against one that is open and lumpy with a tendency to dry out, thus causing the death of the seedlings. Generally speaking, the ground should be ploughed in the autumn and allowed to lie exposed to the winter frosts. In the spring it should be double disked and harrowed, after which the leveller should be used to eliminate small surface inequalities. Sowing may be carried out from the beginning of November to the middle of February. If sown too early or too late, damage by lifting of the soil as a result of frosts is likely to occur. Broadcasting the seed with a hand-seeder of a good type is quite satisfactory. Where a grass-seed attachment is used in conjunction with the ordinary grain-drill, care must be taken to sow the seed as shallow as possible. If it can be sown on the surface and then harrowed in by either a brush or wire-netting harrow (described elsewhere), so much the better. The use of a nurse-crop in sowing down grass, although often adopted for economical purposes, is not recommended.

Care must be taken to see that the ground is sufficiently moist at the time of sowing to ensure a good germination. In actual practice it will usually be necessary to irrigate the ground prior to sowing, following the irrigation by a good harrowing. The importance of using good seed of high germination and freedom from weed-seeds cannot be overstressed.

Where grass is being laid down on a steep sideling it is rarely advisable to plough the ground, on account of the liability of serious erosion taking place when water is applied. The practice to be adopted in such a case would be to give the ground a good double disking and follow this by harrowing. Sowing can then be carried out in the usual manner, and although such conditions cannot be regarded as ideal a good strike will usually be obtained.

IRRIGATION OF GRASS.

A grass pasture, on account of the great growth made throughout the season, requires frequent irrigations to maintain a fresh luxuriant flush of grass. The principles outlined for the irrigation of lucerne apply equally to the irrigation of grass. The system of irrigation adopted will to a great extent be regulated by the grade of land upon which the grass is being grown. For moderately flat lands either the border method or the close-furrow method can be adopted. On steeper land contour irrigation will be practised. From the time of sowing until the grass is well established is the most critical time in the management of a grass pasture. The length of time between irrigations will depend upon the type of soil and weather conditions. The applications of water need not be heavy, but should be given at frequent intervals to keep the surface of the ground moist. It is to be remembered that, as the roots of grasses are comparatively shallow, light

frequent irrigations will give better and more economic results than heavy irrigations extended over long intervals. If a pasture is to produce maximum returns it is necessary to keep it growing continuously throughout the season. It is sometimes stated that growing grass under irrigation is an unprofitable undertaking on account of the large supply of moisture required by the pastures. The water requirement of grass is no higher than that of lucerne; but it is waste of water to apply by means of irrigation as much to grass as would be done in the case of lucerne.

Where grass is sown in spring there will probably be a fair amount of feed at the end of the first summer. Under such circumstances light grazing should be carried out, thus allowing sorrel and other weeds to be eaten off and encouraging the grasses to stool out before coming into seed. The young pasture must not be eaten too closely or over-consolidated by the trampling of stock.

SUBDIVISION OF FIELDS, AND PROVISION OF SHELTER.

It is generally advisable to divide a large field into sections, the number of divisions being dependent on the size of the field, the method of irrigation employed, and the number of stock being grazed. The value of changing stock from one section to another, and thus allowing each section spells in rotation, cannot be overemphasized. This practice is extremely important when dealing with irrigated grass. Nothing will more quickly ruin an irrigated pasture than continuous grazing, and the only way in which this can be avoided is to subdivide the grazing-field. In the case, say, of a 30-acre field it is desirable to subdivide it into three 10-acre fields. This will allow for the animals being changed from one field to another while irrigation is being carried out. It should never be necessary to irrigate a pasture while the animals are grazing upon it, since they would considerably damage it by cutting up the turf with their feet. For these and other reasons the practice of alternating from one pasture to another ensures fresher, better, and far more abundant feed.

Provision of shelter-trees for the stock depasturing on the grass is highly important. As the animals spend the bulk of their time in the fields, provision should be made, by the planting of adequate belts or clumps of trees, to shelter them from the hot sun or cold biting winds.

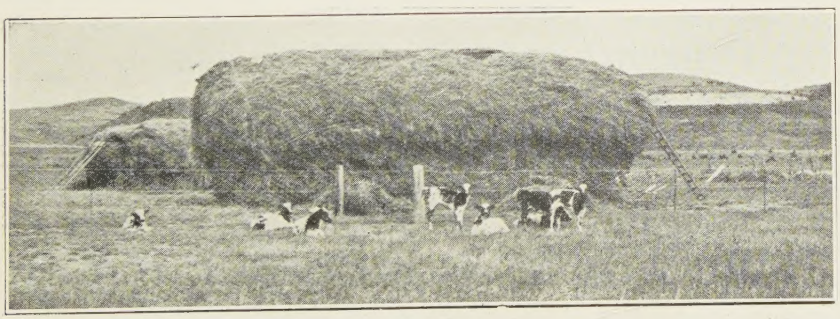

FIG. 60. LUCERNE STACKS AT GALLOWAY IRRIGATION FARM.

CONCLUSION.

In presenting this series of articles, which have been designed primarily for the farmers of Central Otago, it is realized by the writers that only a few of the most salient features in regard to the wide subject of "Irrigation and its Practice" have been touched upon. Although irrigation is of great antiquity, there is much to learn, and still more to unlearn, before perfection in its practice can be attained. Experience, the master teacher, will at all times prove the most valuable factor in regard to the irrigation farmer realizing his aims and ambitions; and, being practically without precedent in New Zealand to guide him, he must rely to a large extent on his own sound judgment. The conviction remains, however, that, with the intelligent and industrious class of farmer who is taking up this type of farming, Central Otago has a great future before it.

Finally, our thanks are due to Mr. F. W. Furkert, Engineer-in-Chief of the Public Works Department, and to Mr. A. H. Cockayne, Director of the Fields Division, Department of Agriculture, for the helpful suggestions and advice rendered in the compilation of this series of articles.

CONTROL WORK ON MEALY BUG AND PEAR-MIDGE.

REARING and distribution of the *Cryptolaemus* ladybird for the control of apple mealy bug have been brought up to a considerable scale this season at the Department's Biological Laboratory. From a colony carried through the winter from last autumn sufficient quantities of beetles have been reared for liberation at intervals at Auckland, Hastings, Blenheim, and Motueka, and further material is being sent out. Reports from Motueka state that the beetle there is already showing its efficiency. Messrs. G. Stratford and W. H. Rice, of the Horticulture Division, have carried out the work of liberation at Motueka and Hastings respectively.

The latest results in the use of calcium cyanide as a soil-fumigant against the pear-midge are extremely promising. Before an account of the work is issued the outcome of certain experiments is being awaited.

—*David Miller, Entomologist.*

HECTOR MEMORIAL AWARD, 1924.

THE Hector Memorial Medal and Prize for the year 1924 have been awarded to Mr. B. C. Aston, Chemist to the Department of Agriculture, for his researches on the chemistry of "bush sickness" in domestic ruminant stock, and of New Zealand flora. It will be recalled that a series of articles by Mr. Aston giving an account of the work in field and laboratory, and developing his "iron-starvation" theory, were published in the *Journal* during last year. The prize and medal of the Hector Memorial Research Fund are awarded annually to the investigator who in the opinion of the Board of Governors of the New Zealand Institute has done most towards the advancement of that branch of science to which the prize and medal are in each year allotted. The allotment is made in rotation for the following subjects: Botany, chemistry, ethnology, geology, physics (including mathematics and astronomy), and zoology (including animal physiology).

VARIATIONS IN THE PERCENTAGE OF BUTTERFAT IN MILK.

A STUDY BASED ON NEW ZEALAND C.O.R. DATA.

(Continued.)

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III. MONTHLY VARIATIONS.

MONTHLY variations in test are fluctuations which occur as the lactation period advances. They are not to be confused with variations which occur from day to day. Lactational or monthly variations are influenced by practically a different set of factors from those which affect daily variations. As it is the phase of test variations which concerns C.O.R. breeders most, it is hoped that this article will help to clear certain points for them. The subject has been treated as simply as possible, and as many of the results as space would permit have been represented by graphs.

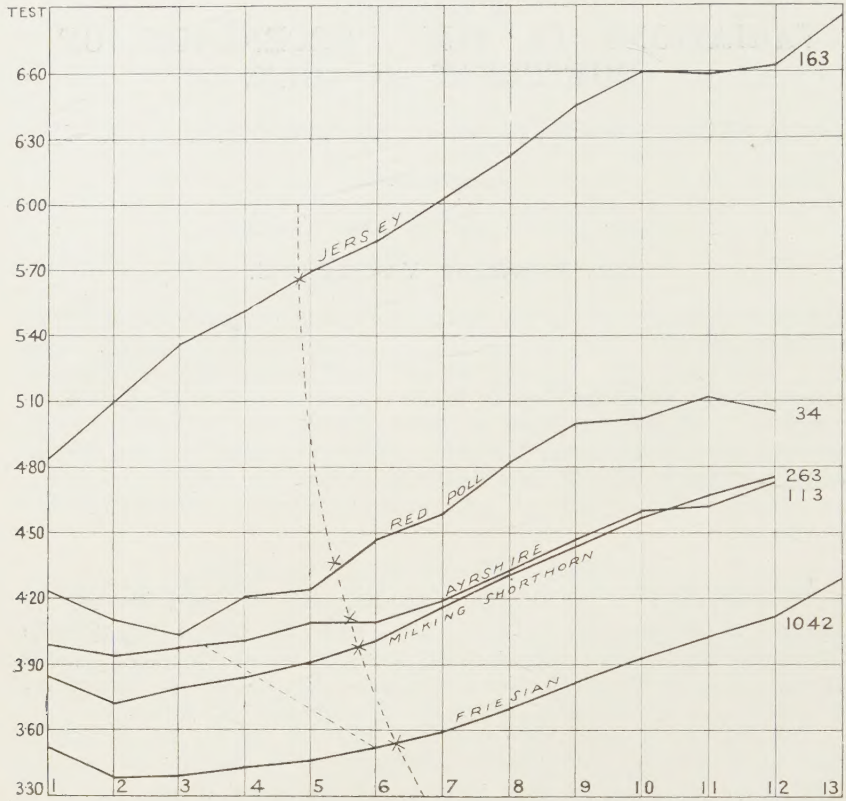
LACTATIONAL VARIATIONS DUE TO BREED.

The difference in lactational variations due to breed are readily apparent in Graph 4 and in Table 7 from which the curves were plotted. The figures in the table represent the averages for all first-class records for the chief breeds up to 31st December, 1923, except in the case of the Jerseys ; with the latter figures for one year only are given.*

The first most noticeable point is that the Jersey graph line is different in general conformation, inasmuch as it exhibits an upward trend from beginning to end, whereas for the other breeds a "dip" appears in the first half of each curve. In the case of the Friesians, Milking Shorthorns, and Ayrshires the length of this "dip" seems to bear some relation to the average test of the breed, as it will be noticed that it becomes less as we consider these breeds in the ascending order of their average tests. To illustrate this more clearly, points have been taken on these curves where they again reach the same point as indicated by the commencement of the curves, and these joined by the straight dotted line shown.† The fact that this line is a straight line may be merely accidental. Apart from the surprising and interesting nature of the result, it is possible that there is some significance attachable to it. Why does it apply only to these three breeds ? The following extract from page 1008 of the *British Friesian Journal* of October, 1924, may help to answer the question : "Among the well-known breeds which are known to have their origin in the cattle of the Netherlands are the Hollandaise of Belgium, Flamande, Boulonaise, and Artesienne of France, Brittenburg and Oldenburg of

* Much laborious work is entailed in obtaining results for lactational-test variations, and it is regretted that time would not permit all the Jerseys being included. The year selected was 1918–19, as this was considered to be a typical average year, and should therefore give a good idea of what the complete figures would reveal.

† The equation for this line is : Number of days in the dip of the lactational-test curve of a particular breed = (722 — 163) times the average test of that breed.



GRAPH 4. LACTATIONAL-TEST CURVES OF THE CHIEF BREEDS.

Germany, and the Kolmogorian breed of Russia. Eminent breed historians, such as Professor Low and Howard, tell us that these same Dutch cattle in the seventeenth and eighteenth centuries helped to form the foundation of the Teeswater breed, now known as the Shorthorn, and of the Dunlop, from which the Ayrshire has been developed by Scottish dairymen." It would be interesting to ascertain if the result obtained held good for the other breeds which are claimed to have their origin in the Dutch cattle. Of course, all curves would need to be obtained from records secured under similar conditions, otherwise the comparison would not be a true one.

The other dotted line shown in the graph joins the points where the average tests would lie on the respective "smoothed" curves. The parabola obtained is interesting, as it is considered probable that curves for other breeds tested in New Zealand would cut this line at points corresponding to the average tests for such breeds.

In Table 8 each monthly test as given in Table 7 is divided by the average test and then multiplied by 100—*i.e.*, the lactational tests are expressed as percentages of the annual test.* By this method

* By "annual test" is meant the average test for the lactation, this being equivalent to the test of the whole of the milk produced taken in one lot.

Table 7. Lactational Tests of the Chief Breeds.

Breed.	Number of Records.	Lactational Tests given in Order.												Average Test.
		1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.	13th.	
Jersey	163	4·85	5·11	5·37	5·52	5·70	5·83	6·03	6·22	6·45	6·60	6·59	6·63	6·86	5·66
Red Poll	34	4·24	4·11	4·04	4·22	4·25	4·48	4·59	4·82	5·00	5·02	5·12	5·06	..	4·37
Ayrshire	113	4·00	3·95	3·99	4·02	4·10	4·10	4·20	4·33	4·47	4·60	4·62	4·73	..	4·12
Milking Shorthorn ..	263	3·85	3·73	3·80	3·85	3·92	4·02	4·17	4·32	4·44	4·57	4·67	4·75	..	3·99
Friesian	1,042	3·53	3·39	3·40	3·44	3·47	3·53	3·60	3·71	3·82	3·93	4·03	4·12	4·29	3·55

NOTE.—The average tests for the various breeds here quoted were obtained in the following manner: The total butterfat is divided by the total milk-production for each cow, and the arithmetical average of all these average tests is the result quoted. In the first article of this series the average tests for the different breeds were obtained by dividing the total butterfat for all cows by the total milk for all cows. It will be noticed there is very little difference between the two sets of results. Jersey figures in this case are for 163 records as against 2,391 previously (see Table 13).

Table 8. Lactational Tests of the Chief Breeds expressed as Percentages of the respective Average Annual Test.

Breed.	Number of Records.	Lactational Tests given in Order.												
		1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.	13th.
Jersey	163	86	90	95	98	101	103	107	110	114	117	116	117	121
Red Poll	34	97	94	92	97	97	103	105	110	114	115	117	116	..
Ayrshire	113	97	96	97	98	100	100	102	105	109	112	112	115	..
Milking Shorthorn ..	263	97	94	95	97	98	101	105	109	112	115	117	119	..
Friesian	1,042	99	96	96	97	98	99	101	105	108	111	113	116	121

all figures are reduced to one basis, and comparison can thus be more readily made. One striking point is that for the fourth test all breeds practically coincide. The Red Polls and Jerseys agree fairly closely from the sixth test onwards, and the Ayrshires and Friesians agree quite well right through except for the difference in dip. It is interesting to note that for the first lactational test the Jerseys commence at a considerably lower point than do the other breeds.

The next aspect worthy of consideration is the average total range of variation—*i.e.*, the difference in the average of the highest and lowest tests for all cows of each breed. Table 9 gives the results of this analysis. The only point of particular interest brought out in this table is in regard to the average lowest test. With the exception of the Jerseys, it appears that the average lowest lactational test is practically a constant percentage of the average annual test. The average highest lactational test, therefore, is mainly responsible for the total range of variation. The total range of variation, however, appears to be a peculiarity of the breed, as it bears no apparent relation to the average test for the year.

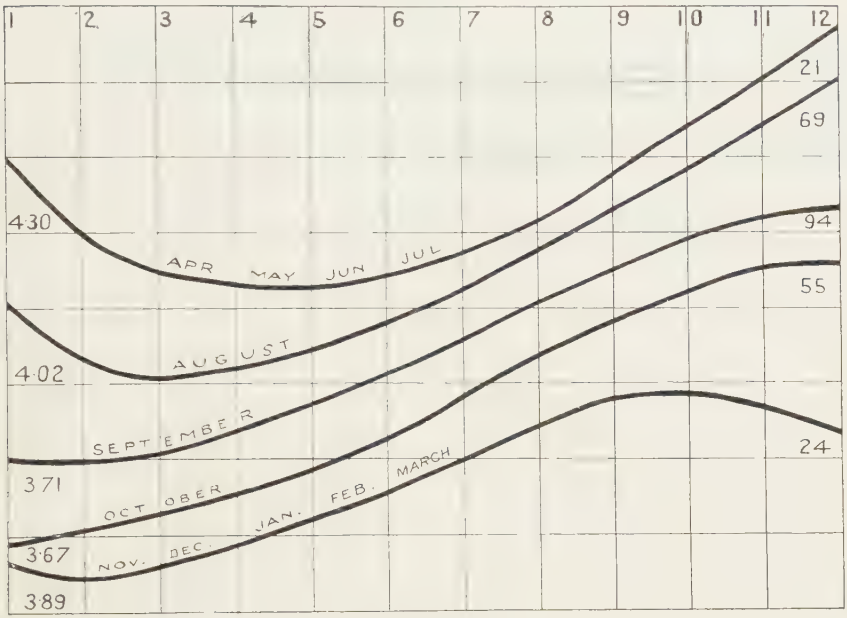
Table 9. Range of Variation in Lactational Tests of the Chief Breeds.

Breed.	Number of Records.	Average Test.	Lactational Tests.		Total Range of Variation.	Percentage Range of Variation.	Highest Test expressed as Percentage of Average Test.	Lowest Test expressed as Percentage of Average Test.
			Average Highest Test.	Average Lowest Test.				
Jersey ..	163	5·66	7·01	4·68	2·33	41	124	83
Red Poll..	34	4·37	5·51	3·82	1·69	39	126	87
Milking Shorthorn	263	3·99	5·01	3·47	1·54	39	126	87
Friesian ..	1,042	3·55	4·37	3·12	1·25	35	123	88
Ayrshire..	113	4·12	4·95	3·64	1·31	32	120	88

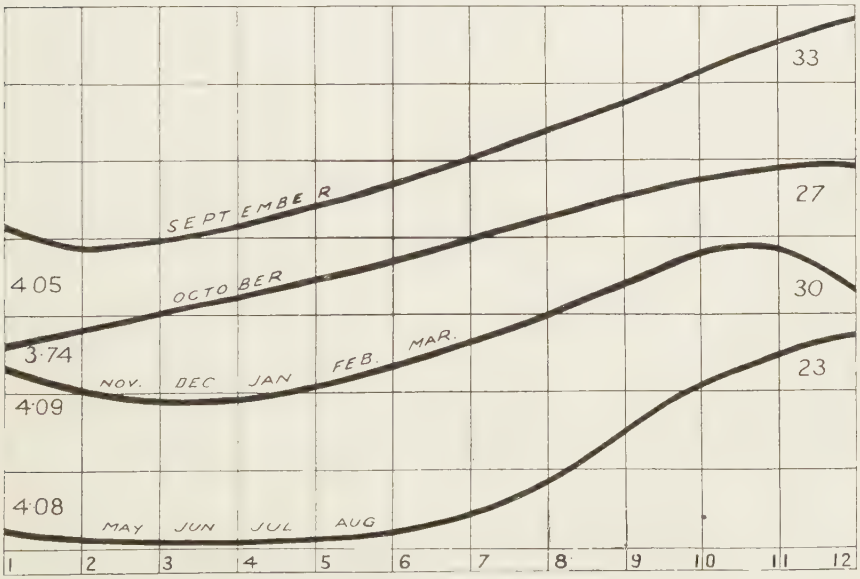
LACTATIONAL VARIATIONS DUE TO TIME OF YEAR OF CALVING.

In Graphs 5 and 6 it is readily apparent that the influence of the factor of time of year of calving on the lactational-test variations is considerable.* The first test and the number of records for each curve are given on the left and right respectively. In conformation the curves for similar periods for Ayrshires and Milking Shorthorns bear a striking resemblance, and this indicates that the effect on these two breeds is similar. The dip in the curves becomes smaller up to the month of October, when it almost entirely disappears. The result is practically a straight line with a uniform upward trend from beginning to end. The curves for the summer period exhibit a shallow dip and a "falling away" towards the latter end. This falling-away tendency can be noticed slightly in the September and more distinctly in the October curves. However, the quantity of data available in the case of the Friesians is sufficiently large to show curves for each month of commencement.

* The curves shown in these two graphs are of the "smoothed" type.



GRAPH 5. LACTATIONAL-TEST CURVES FOR MILKING-SHORTHORN COWS COMMENCING AT DIFFERENT PERIODS OF THE YEAR.



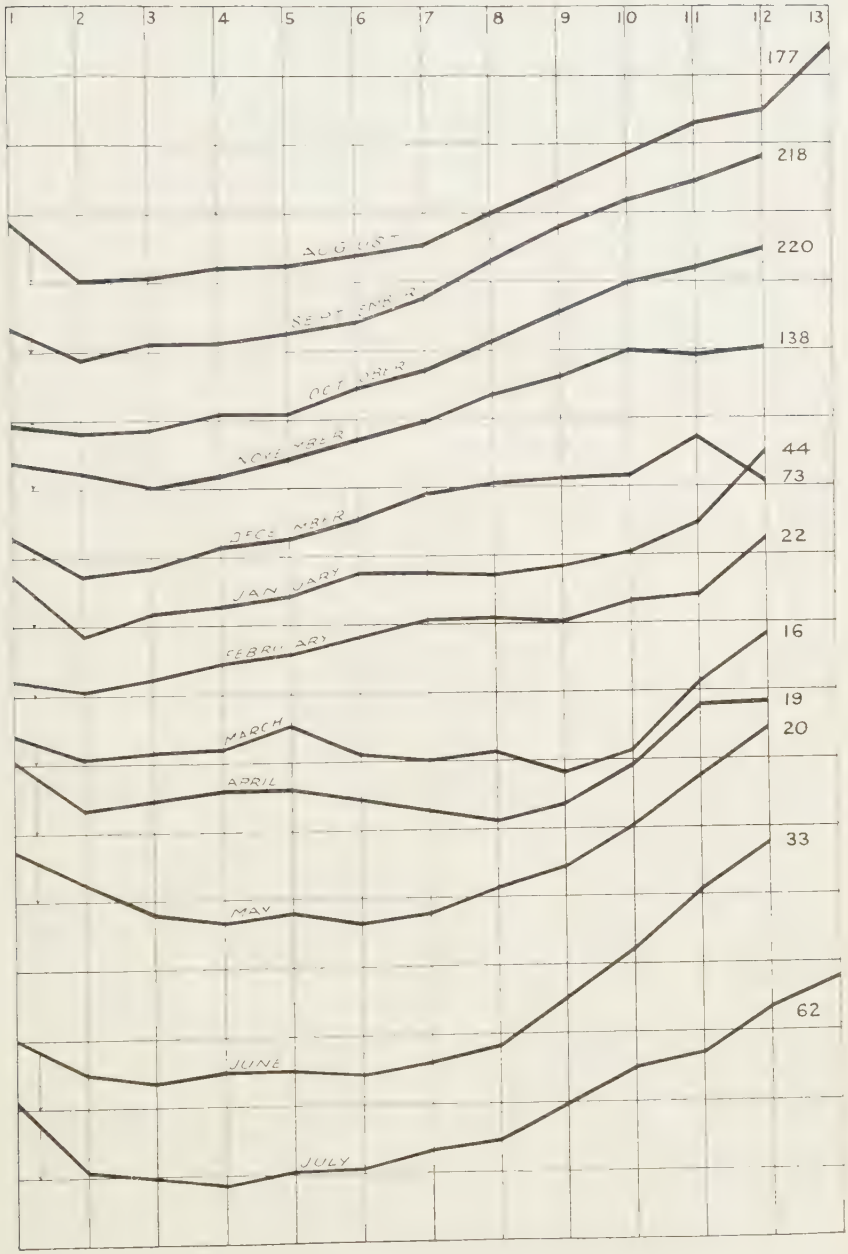
GRAPH 6. LACTATIONAL-TEST CURVES FOR AYRSHIRE COWS COMMENCING AT DIFFERENT PERIODS OF THE YEAR.

The vertical side of each square in both graphs equals 0·30 per cent.

The results are presented in Graph 7, in which the numbers on the right give the number of records included for each curve. From August to December that portion of the curves from the tenth to the twelfth tests has been gradually depressed, until for December the twelfth point is below that for the tenth. From August to October the dip becomes less, until for October it is very slight. However, the dip occurs again to a greater extent in the November curve, with the depth of the dip increasing up to January. In the December curve a flattening-out of the portion from the ninth to eleventh tests will be noticed as compared with the same portion in the November curve. In January we have a "two-dip" curve, the second dip making its appearance at the eighth test. The February curve has the second dip at the ninth test, while for March we have two pronounced dips separated by a high point at the fifth test. From April to July the two dips are gradually transformed into one long dip by the gradual depression of the high point at the fifth test. May, June, and July curves climb very steeply from the eighth test onwards, June having the greatest gradient.

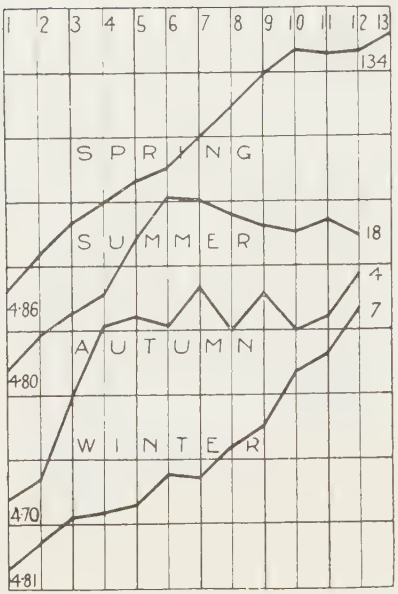
Average lactational tests have been run out for the four chief breeds, grouping separately spring, summer, autumn, and winter calvers, as shown in Graph 8. Considering the graphs for Friesians, Milking Shorthorns, and Ayrshires only, a marked similarity is noticeable in the respective curves for cows commencing in different seasons of the year. The spring curves have first a small dip, and then a gradual upward trend right to the end. The summer curves are shaped something like the letter "S" lying on its side and considerably straightened out, the final regression of the test being well borne out. The autumn curves are "two-dip" curves, the dips being separated at the fifth test. In the case of the Ayrshires there are really three dips, but this is considered unimportant owing to the very small number of records for this curve. It is satisfactory, however, to observe that the characteristic of the fifth point is nevertheless quite apparent. All the winter curves have long and deep dips, with fairly sharp "risings" at the ends. The Jersey graph presents what appears quite a different position from those of the other breeds. As there is no dip in the first portion of each of the curves, comparison at first seems difficult. However, if we compare the respective curves from the seventh test onwards it is obvious that the agreement for the four breeds is quite close. As in the case of the Milking Shorthorns and Ayrshires, autumn calvers are poorly represented numerically in the Jerseys, and the curve for this reason is rather irregular. Nevertheless the fifth test ranks high. To properly follow the effect of the time of commencement on the lactational-test curves for the Jerseys, all the Jersey data would need to be utilized, as has been done in the case of the Friesians, in order that curves could be shown for each month of commencement.

The difference in range of variation of the lactational tests for cows commencing at different periods of the year is of some interest. In Table 10 figures for the chief breeds are given according to the season of the year of commencement. In considering range of variation the year seems to be divided into two rather than into four, since on the one hand figures for spring and winter, and on the other figures for summer and autumn, agree fairly closely. Range-of-variation figures were run

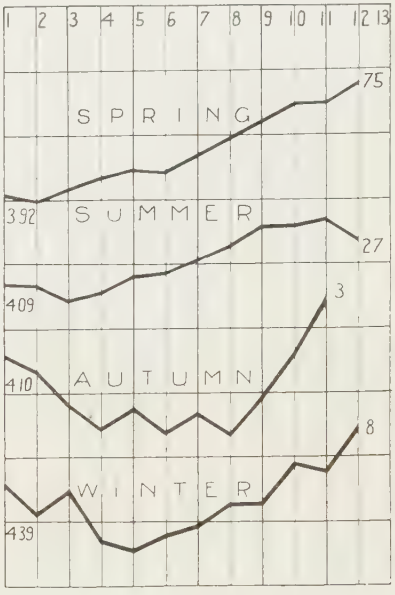


GRAPH 7. LACTATIONAL-TEST CURVES FOR FRIESIAN COWS COMMENCING IN DIFFERENT MONTHS OF THE YEAR. (VERTICAL SIDE OF EACH SQUARE EQUALS 0·30 PER CENT.)

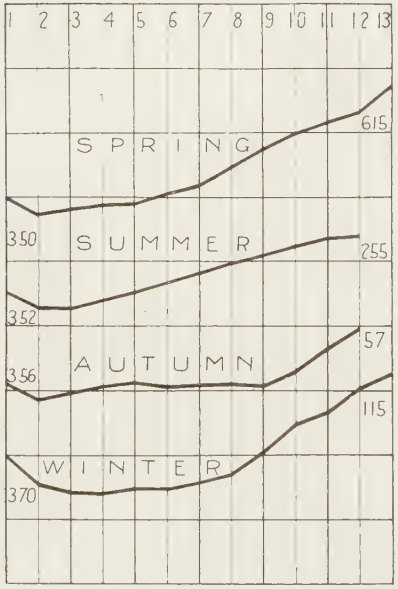
The arrow connected to each curve indicates the 3·4-per-cent. line for that particular curve. By this means tests may be read off for all curves.



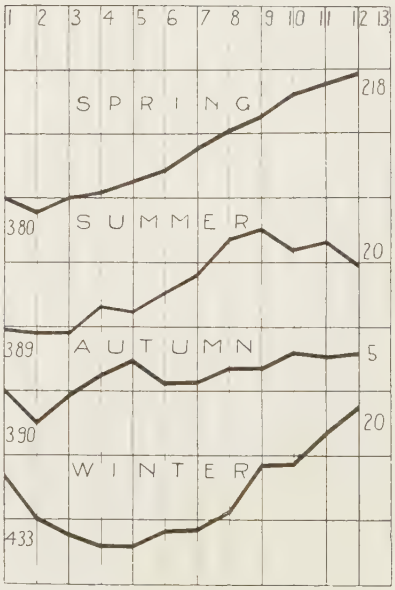
Jerseys.



Ayrshires.



Friesians.



Milking Shorthorns.

GRAPH 8. LACTATIONAL-TEST CURVES FOR SPRING, SUMMER, AUTUMN, AND WINTER CALVERS OF THE CHIEF BREEDS.

The vertical side of each square equals 0·50 per cent. Figures on left are the first test for each curve; figures on right give the number of records for each curve.

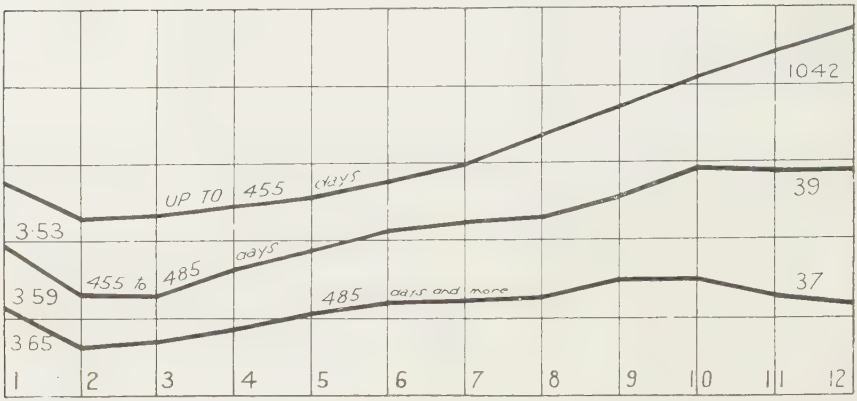
out for several breeds for different months of commencement, and it was found that the greatest ranges occurred for July, August, September, and October. The next highest were May, June, and November, while December, January, February, March, and April ranked lowest. We arrive at the interesting conclusion that cows commencing during the wet season of the year show a greater range of variation in test than do cows calving in the dry season, although in each case cows were milked through all periods of the year.

Table 10. Range of Variation in Lactational Tests of Chief Breeds for Cows commencing during Different Periods of the Year.

Period.	Number of Records.	Average Test.	Lactational Tests.		Total Range of Variation.	Percentage Range of Variation.	Highest Test expressed as Percentage of Average Test.	Lowest Test expressed as Percentage of Average Test.
			Average Highest Test.	Average Lowest Test.				
			JERSEYS.					
Spring ..	134	5·69	7·09	4·70	2·39	42	125	83
Summer ..	18	5·50	6·52	4·57	1·95	36	119	83
Autumn ..	4	5·79	6·75	4·63	2·12	37	117	80
Winter ..	7	5·56	6·81	4·67	2·14	38	122	84
			MILKING SHORTHORNS.					
Spring ..	218	3·98	5·02	3·45	1·57	39	126	87
Summer ..	20	4·09	4·97	3·56	1·41	34	121	87
Autumn ..	5	3·96	4·65	3·58	1·07	27	117	90
Winter ..	20	4·07	5·00	3·51	1·49	37	123	86
			FRIESIANS.					
Spring ..	615	3·54	4·41	3·11	1·30	37	125	88
Summer ..	255	3·56	4·26	3·15	1·11	31	120	89
Autumn ..	57	3·55	4·21	3·14	1·07	30	119	89
Winter ..	115	3·56	4·46	3·13	1·33	37	125	88
			AYRSHIRES.					
Spring ..	75	4·12	4·97	3·62	1·35	33	121	88
Summer ..	27	4·14	4·86	3·72	1·14	28	117	89
Autumn ..	3	3·74	4·50	3·43	1·07	29	120	91
Winter ..	8	4·18	5·16	3·66	1·50	36	123	87

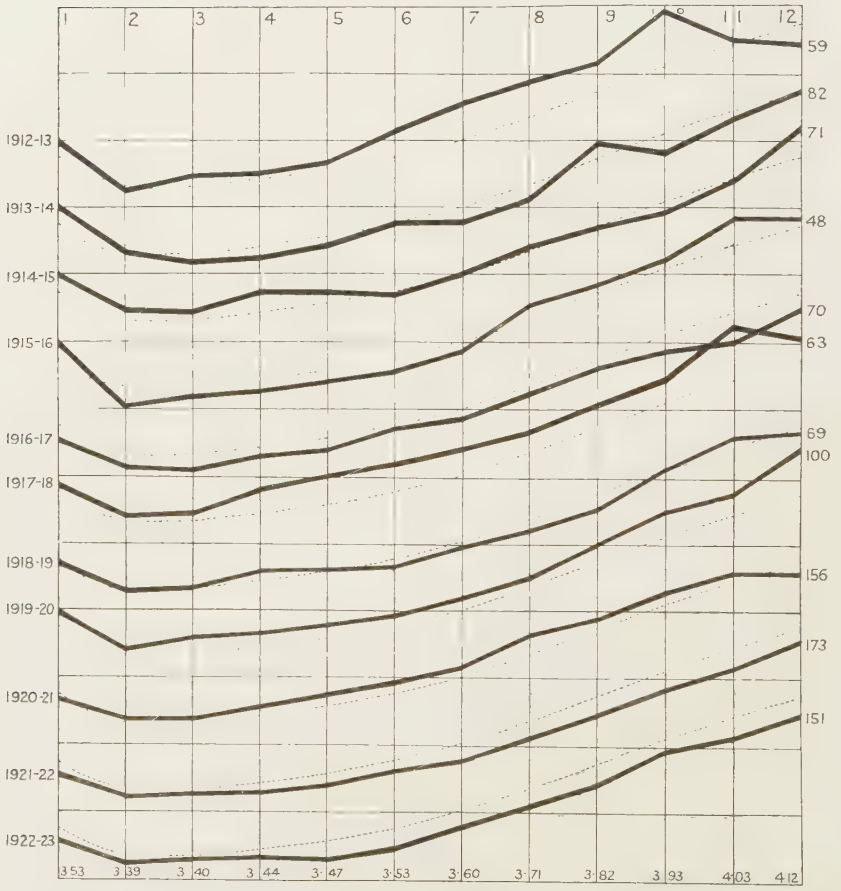
LACTATIONAL VARIATIONS DUE TO LENGTH OF PERIOD OF GESTATION.

The length of time a cow is in calf during test has considerable influence on the lactational-test variations, inasmuch as the general conformation of the monthly-test curve is appreciably affected. This is clearly shown in Graph 9. In compiling this graph records for the Friesians were taken. On the left of the graph the first test for each curve is indicated, and along the curves the limits of the number of days between calving at commencement of test and subsequent calving are given. The numbers on the right indicate the number of records represented in the respective curves. Only three curves are shown, but these serve to indicate the trend of the variation very well. More curves were not shown for the reason that some would necessarily have been somewhat irregular owing to the smallness of the number of records included. The top curve is for all first-class certificates, being



GRAPH 9. FRIESIAN LACTATIONAL-TEST CURVES, SHOWING EFFECT OF PERIOD OF GESTATION.

Vertical side of each square equals 0·30 per cent.



GRAPH 10. FRIESIAN LACTATIONAL-TEST CURVES FOR DIFFERENT SEASONS.

Vertical side of each square equals 0·30 per cent.

for cows calving within 455 days after start of test. The middle one represents all second-class certificates, and also includes other records equivalent to second class but which were made before the introduction of the second-class certificate, and are for cows calving between 455 and 485 days after start of test. The bottom curve represents some of the records for which calvings were available and for which the period was 485 days and more—*i.e.*, all these cows failed on subsequent calving for both first and second-class certificates. From the ninth test onwards the difference of trend in these curves is readily apparent. No difference in general conformation was found in the curves for the limits—515–545, and 545 and more days. The change in trend of the test curves evidently ceased after a period of about 515 days. From this it may be accepted that the effect of gestation on the test curve of a cow calving 515 days after commencement is negligible. In other words, a cow may be pregnant for a period up to about four and a half months during a 365-day lactation without this influencing the test in any way. A. C. Ragsdale, C. W. Turner, and S. Brody stated as a conclusion to their investigation on the "Effect of Gestation upon Lactation in the Dairy Cow" that when during lactation the period of pregnancy exceeds about five months the effect of pregnancy becomes apparent in a reduced rate of milk-secretion (*Journal of Dairy Science*). When it is remembered that quality and quantity of milk depend on one another to some extent, the fact that the two conclusions quoted agree so closely is not at all surprising.

LACTATIONAL VARIATIONS DUE TO NATURE OF SEASON.

The Friesian data have been utilized to test this factor, and the results are given in Graph 10. The dotted curve in each case denotes the average lactational-test curve for all Friesians, while the whole lines represent the average monthly tests for different seasons. On the left the seasons are given, and on the right the number of records for each season is supplied. By showing the curve for all Friesians each time comparison is considerably facilitated. For reference and comparison, tests for the dotted curve are given at the foot of the graph. In all cases it will be noticeable that the curves do not vary much from the average, and that their general conformation remains fairly uniform. In the case of the 1918–19 season the yearly curve approaches the average right throughout better than for any other season. The Milking Shorthorns gave a similar result.* In general it is found that where bad seasons were experienced the yearly curves lie above, while for good years they lie below, the curve for all years. Good seasons were experienced for 1913–14, 1915–16, 1921–22, and 1922–23, while for 1912–13, 1914–15, 1919–20, and 1920–21 the seasons were considered to be poor ones, and in each case the foregoing statement holds good.

LACTATIONAL VARIATIONS DUE TO CONDITION OF THE COW.

This factor has been already mentioned in the second article of this series, but, as there stated, it has no influence on daily variations in test, since the latter are variations considered for much shorter periods

* It was for this reason that the 1918–19 data of the Jerseys were taken in every instance as being likely to supply the probable average for all Jerseys.

Table 11. Lactational Tests of the Highest-testing Individuals of the Chief Breeds.

Breed.	Monthly Tests given in Order.													Average Test.	First Test made in
	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.	13th.		
Jersey	5·70	7·30	6·50	7·40	8·90	9·60	8·10	8·30	8·50	8·30	8·55	8·34	..	7·65	November.
Red Poll	4·47	4·90	5·34	5·13	5·27	5·44	5·10	5·61	6·05	5·44	5·88	5·37	..	5·29	October.
Ayrshire	4·50	4·65	5·48	5·58	5·20	5·30	5·64	5·29	5·49	6·21	..	..	..	5·25	September.
Milking Shorthorn ..	5·80	5·80	5·10	4·60	5·50	5·10	5·60	6·10	6·20	6·50	7·10	6·30	..	5·60	August.
Friesian	4·05	4·34	4·80	4·58	4·37	4·91	5·27	5·25	5·32	5·70	5·91	5·64	..	4·89	July.

Table 12. Lactational Tests of the Lowest-testing Individuals of the Chief Breeds.

Breed.	Monthly Tests given in Order.													Average Test.	First Test made in
	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.	13th.		
Jersey	2·60	3·78	3·14	3·95	3·85	4·09	4·78	4·10	4·24	4·44	4·81	4·64	..	3·85	November.
Red Poll	3·50	3·80	3·43	3·33	3·79	3·90	3·99	3·88	3·74	3·91	3·99	3·86	..	3·72	October.
Ayrshire	3·60	3·50	3·50	3·10	3·40	3·00	3·10	3·00	3·20	3·20	..	..	..	3·29	December.
Milking Shorthorn ..	3·90	3·34	3·04	2·80	2·90	3·04	3·17	2·95	3·34	3·41	3·29	3·48	..	3·16	August.
Friesian	2·29	3·08	2·39	2·61	2·54	2·80	3·45	3·10	2·94	2·83	..	..	..	2·74	August.

than a month. The condition of a cow at time of calving is believed to somewhat influence the monthly test curve. Unfortunately, our C.O.R. data cannot be used in this case, since no record is obtained in regard to the condition of a cow at commencement of test.

There are two kinds of condition, known respectively as "soft" and "hard," and either is obtained by difference in ration. As the names indicate, a soft condition is soon reduced, and is suitable for butterfat trials at shows, while a hard condition is not reduced so quickly by flush of milk-production, and "milks off" much slower. The latter is therefore the better condition to obtain in fitting a cow for C.O.R. test. The test curves for poor-, soft-, and hard-conditioned cows should show a difference in conformation one from the other, and all would no doubt be influenced by feeding during test. It is patent, therefore, that the whole question could be properly treated only from the results of a carefully planned experiment.

LACTATIONAL VARIATIONS DUE TO AGE.

A trial with the 1918–19 season Jersey data showed that the lactational-test variations were similar for different ages, all the curves being alike in general conformation. This factor may therefore be dismissed as one which does not materially affect the trend of the lactational-test curves.

LACTATIONAL VARIATIONS DUE TO QUANTITY OF MILK-PRODUCTION.

The 1918–19 two-year-old Jersey figures, when grouped according to quantity of milk-production, produced curves which were all uniform in general conformation. Difference in annual milk-production does not produce difference in the respective lactational-test curves. As a matter of fact, all curves for this factor as well as those for that of age were inclined at practically the same angle.

GENERAL EXAMPLES.

Before passing on to conclusions a few individual examples may prove of interest. In the Tables 11 and 12 the monthly tests are supplied for the highest- and lowest-testing cows of the principal breeds.

Table 13 has been compiled to illustrate how high and how low cows may test during a lactation. The tests quoted were taken from first-class C.O.R. records, and were allowed to stand, the cows at the time of test being normal as far as was known.

Table 13. Highest and Lowest Monthly Tests of the Chief Breeds.

Breed.	Highest Test.	Lowest Test.	Average Test of Breed.*
Jersey	11·60	2·60	5·55
Red Poll	6·50	3·24	4·39
Ayrshire	9·53	2·91	4·11
Milking Shorthorn ..	7·80	2·60	3·97
Friesian	8·00	2·13	3·54

* As given in the first article of this series (*Journal*, September, 1924).

Table 14. Exceptional Examples.

Key.	Order of Tests during Lactation.												Average Test.	Breed.
	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.	13th.	
A	6·00	5·70	5·80	5·80	6·70	6·60	7·00	7·40	8·10	9·20	9·30	9·20	..	6·65	Jersey.
B	5·20	4·90	6·60	7·10	6·80	6·70	7·30	8·20	9·00	9·40	8·80	..	..	6·67	Jersey.
C	3·64	4·14	3·32	3·78	4·58	5·14	6·00	6·27	8·20	9·53	..	..	..	4·48	Ayrshire.
D	3·33	3·06	3·23	3·22	3·15	3·01	3·02	3·17	3·04	3·18	3·10	3·08	..	3·13	Friesian.
E	3·40	4·00	4·00	4·00	4·00	3·60	3·70	4·00	3·90	3·80	3·90	..	..	3·84	Milking Shorthorn.
F	4·14	3·80	3·99	3·95	3·95	3·95	3·95	4·01	4·31	4·65	4·35	4·40	..	4·09	Jersey.
G	3·50	3·50	3·50	3·60	3·60	3·60	3·60	3·60	3·40	3·30	3·90	4·50	..	3·54	Friesian.
H	3·40	3·40	3·40	3·50	3·80	3·60	3·70	3·80	3·80	3·80	4·00	..	..	3·59	Ayrshire.

Key.

A and B give tests for the same cow for two consecutive seasons, and provide a good example of consistent high testing.

C is a remarkable case of extreme range in variation.

D is an exceptional case of small range in variation.

E, F, G, and H are all examples where a number of consecutive monthly tests have all come out the same.

For the final Table 14 examples have been specially selected from C.O.R. data, and serve to show how remarkably some cows test.

CONCLUSIONS.

To sum up, there appear to be only five factors which materially influence monthly-test variations. They are (1) the breed; (2) time of commencement of lactation during year; (3) length of period of gestation during test; (4) nature of season; and (5) condition of cow, feeding, &c.

NOTE.—Unless otherwise stated the C.O.R. data used in the case of each breed include all first-class records from the year 1913 up to 31st December, 1923. The figures quoted for the Jerseys in each case are for the 1918–19 season, with the exception of Tables 11, 12, and 13, which are for all Jerseys up to 31st December, 1923.

(To be continued.)

THE MAKING OF ARTIFICIAL FARMYARD MANURE.

TRIALS AT LINCOLN.

M. J. SCOTT, B.A. (Cantab.), B.Sc., A.I.C., Canterbury Agricultural College, Lincoln.

WHILE the efficacy of farmyard manure has been variously attributed to its manurial constituents, its colour-producing capacity and consequent warming, its water-holding capacity, its mechanical effect, &c., there appears to be no doubt that its most useful feature in the soil is the giving-off of gas by the action of bacteria which feed on it. Just as yeast feeding on the sugars in dough gives off a gas (carbon dioxide) which causes the bread to rise, so bacteria with an abundant supply of organic matter give off the same gas in the soil, thus aerating it. Further, experience has shown that farmyard manure has a very decided value, and in pre-war England 35,000,000 tons of it were used annually. With the advent of motors and the war demand on pasture lands for the production of cereals, and the consequent decline in the production of fat beef, a considerable falling-off in output of this manure resulted —so much so that the Food Ministry, realizing its economic importance, were at pains to find a means of supplementing the supply. Dr. Hutchison, of the Rothamsted Experimental Station, was able to demonstrate that the bacteria which decompose organic matter in the soil were distributed everywhere, and required for growth only moisture and adequate food-supply.

Since 1919 artificial farmyard manure has been made at Rothamsted and used on various crops. In no case did the yields therefrom differ materially from those obtained from the use of bullock-made dung. This being so, sufficient encouragement from the farming community was forthcoming to warrant the formation of a syndicate consisting of the original investigators and others, calling themselves the Agricultural Development Company (A.D.C.O.), for the making of artificial farmyard manure on a large scale. The process of making, or perhaps the chemicals used for treating the straw, have been patented in England,

America, and elsewhere, but not in New Zealand so far as the writer knows.

In 1921 the writer, then at Rothamsted, was greatly impressed with this process of rotting down straw. Knowing the condition of affairs in Canterbury, where straw is commonly burnt, stock not housed, and farmyard manure consequently not made, he could not help thinking that here was a proposition that sooner or later must commend itself to those of our farmers who want to maintain the life of their soil.

Having subsequently returned to New Zealand, obviously the first thing to be done was to find out if straw would rot in three months under local conditions, and with this in view an attempt was made at the College in January, 1924. We tried six stacks in all—two of wheat, two of oats, one of barley, and one of grass straw—containing a total of about 70 tons. A 2½-horse-power Blackstone engine and pump that delivered from 600 to 900 gallons of water per hour was used. The water was pumped through 2 in. pipes to the middle of the top of the stack, and then distributed in a series of jets through ⅛ in. holes evenly spaced along a pipe lying on the stack. This pipe was movable, and wet the stack to a distance of 4 ft. to 6 ft. on either side of it. It was moved every half hour or so in order to wet the stack as evenly as possible. As a source of nitrogen, ammonium sulphate was used, and, when in sufficient quantity, appeared to be quite satisfactory.

The amount of water to be used seems a fairly variable quantity locally, owing to the enormous evaporation which takes place in north-west weather. We pumped somewhere between 800 and 1,200 gallons per ton of dry straw. This was done at about fortnightly intervals, pumping always until the run-back—collected in a hole by a drain round the stack—was nearly equal to the capacity of the pump.

The greatest difficulty we had to encounter was getting the stack uniformly wet. Particularly was this so on the old stacks (two-year-old), which, built to keep the water out, invariably "felted" somewhere below the surface and were quite waterproof. There was no difficulty with newly built stacks, which wetted uniformly and rotted completely. To overcome the felting we punched holes in the stack with a long pipe. If such holes are put in on a slant they distribute the water quite well, but if vertical the water merely runs down them to the ground and wets a column of straw only about 6 in. to 12 in. in diameter.

When the rotting is satisfactory the stack loses its stack-like form and becomes just a manure-heap, and sinks till it is about one-third of the original height. We considered the straw sufficiently rotten when it was of a rich dark-brown colour and breakable by twisting a large handful. It is not difficult to see how the stack is wetting by an inspection of the top. Ridges appear where there is dry straw underneath. The temperature rises to between 65° and 75° C.—too hot to place one's hand in the material. It would be advantageous if it could be kept lower, as a great deal of soft tissue is destroyed at such temperatures and the fibrous parts of straw remain as a stringy mass.

Of the six stacks, three and a half rotted sufficiently to be carted out—the barley stack, one and a half of the wheat stacks, and half of each of the oat stacks. Everything rotted that had enough water, but the difficulty of wetting the material throughout was not easily overcome. The grass stack was not persevered with. Wheat or oat straw when crushed splits and allows the water to get inside, where it

is absorbed by the pith. Grass-straw does not split in this way, and consequently no amount of wetting would cause it to absorb any quantity of water.

In all we expected between 250 and 280 tons of farmyard manure, and we carted out about 180 tons. As already stated, operations were commenced in January, and the dung was ploughed under in June last, being applied at the rate of 60 to 70 loads, equivalent to 25 to 30 tons, per acre. Strips were left unmanured, the plan being to estimate the effect of the manure on the yield of mangolds. Results will be recorded later, after harvesting of the crop.

Whether this process will develop or not is entirely a matter of cost, and that aspect is being investigated. At present we are satisfied that the straw rots satisfactorily if the right conditions for bacterial growth are obtained.

CORTICIUM-DISEASE OF POTATOES.

EXPERIMENTS IN CONTROL.

(Concluded.)

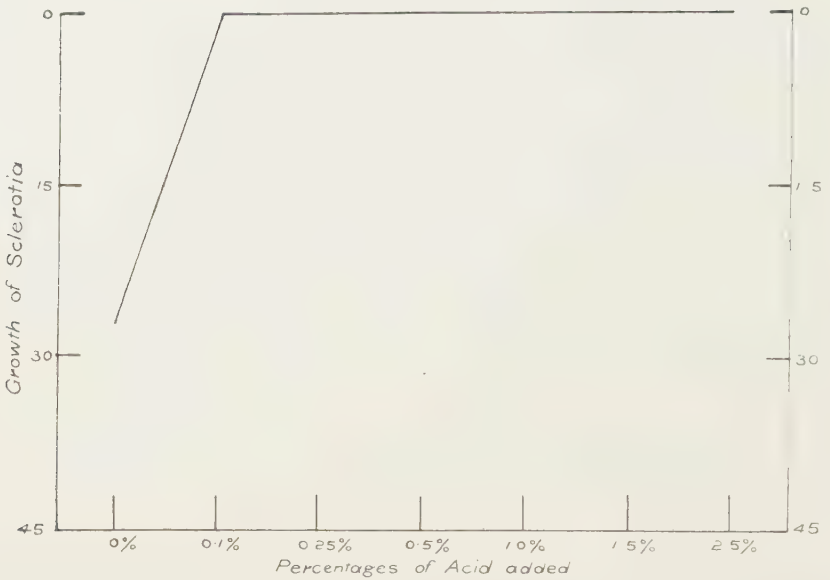
G. H. CUNNINGHAM, Mycologist, Biological Laboratory, Wellington.

In a previous article (*Journal* for last month) it was shown that the standard treatments recommended for the control of corticium-disease, *Corticium vagum* var. *Solani* Burt, were not successful because they did not kill more than about 80 per cent. of the sclerotia present on the tubers treated. Numerous experiments were undertaken with a view to discovering some cheap and efficient means of killing these sclerotia, with the result that mercuric chloride, *when acidulated with hydrochloric acid*, was found completely to kill all sclerotia even at strengths much less than usually recommended.

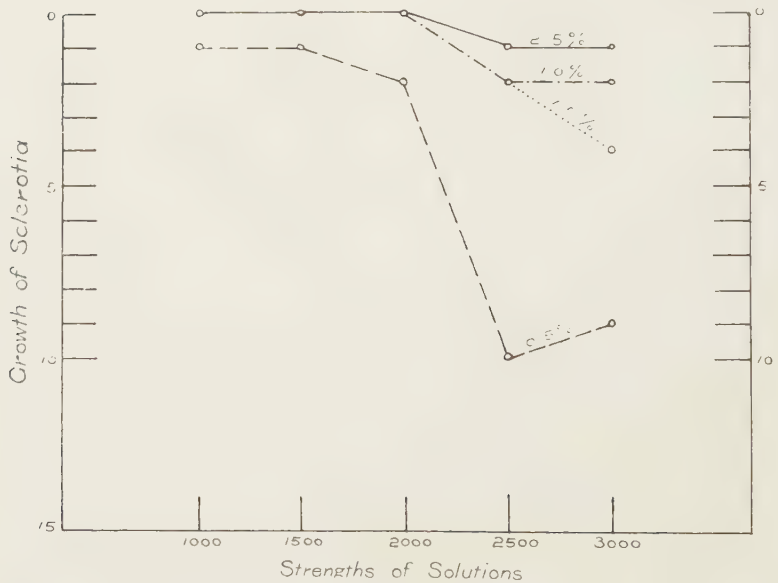
These experiments solved the problem in so far as the steep was concerned, so that there then remained the problem of cheapening the process in both material and labour. In regard to the latter factor, it is evident that a more practical method than the two-hour steep is necessary in dealing with the large quantity of seed tubers used by commercial growers. Therefore experiments were undertaken with a view to modifying the period of immersion.

For the smaller growers with a small quantity of seed to treat, it might be more practicable to place the tubers overnight in some suitable solution, to be ready for planting the following morning. Graph 7 shows that a solution of 1 part of mercuric chloride in 10,000 parts of water, when acidified with as little as 0·1 per cent. of hydrochloric acid, gives complete killing of all sclerotia, a result not obtained with an acid-free solution of this strength.

Further experiments were undertaken with a view to reducing the time of immersion to such an extent that treatment could be made a continuous process, thus making machine treatment feasible. The results finally obtained are shown in Graph 8. In this experiment tubers were immersed for five minutes in acidulated mercuric-chloride solutions of the following strengths: Mercuric chloride—1–1,000, 1–1,500, 1–2,000, 1–2,500, 1–3,000; hydrochloric acid—0·5 per cent., 1 per cent.,



GRAPH 7. SHOWING EFFECTS, AFTER SIXTEEN HOURS' IMMERSION, OF DIFFERENT PERCENTAGES OF ACID (H CL) ON THE KILLING-PROPERTIES OF 1—10,000 MERCURIC-CHLORIDE SOLUTIONS.



GRAPH 8. SHOWING EFFECTS, AFTER FIVE MINUTES' IMMERSION, OF DIFFERENT PERCENTAGES OF ACID WHEN ADDED TO SOLUTIONS OF MERCURIC CHLORIDE.

The curves represent percentage strengths of acid.

1·5 per cent., 2·5 per cent. After treatment the tubers were placed in a heap and covered with a sack wetted with 1–3,000 mercuric chloride. They were left overnight and the sclerotia plated out in the morning.

Graph 8 shows that this treatment resulted in the death of all sclerotia taken from those tubers which had been immersed in 1–1,000 and 1–1,500 solutions to which had been added 1, 1·5, and 2·5 per cent. of hydrochloric acid. This reduction in time required for treatment allows of the treatment of tubers in large quantities by the use of a mechanical device whereby tubers may be carried on a conveyer through the solution and transported to the drying-floor.

DIRECTIONS FOR TREATMENT.

Overnight Treatment.—Procure a wooden or concrete (not metal) tub or trough and fill with Solution A (see below). Place the tubers in this solution, being careful to have sufficient liquid present to cover all to a depth of at least 3 in. Leave the tubers in overnight, and in the morning remove and either immediately plant or dry and store until required. The time of immersion (sixteen hours) is merely an arbitrary one, as equal results will be obtained whether the tubers are left in the solution for twelve or twenty-four hours.

Five-minute Treatment.—Prepare solution in the same way as in the previous treatment, but use instead Solution B (see below). Leave in for at least five minutes (longer periods than this will have no detrimental effect upon the tubers) and remove to a floor, where the tubers should be piled in heaps and covered with sacking dipped in the same solution. Leave the heap covered for from sixteen to twenty-four hours, and either plant immediately or dry and store until required.

SOLUTIONS.

Solution A, Sixteen-hour Treatment. — Stock solution: Mercuric chloride, 50 grams (1¾ oz. approx.); hydrochloric acid (conc.), ½ litre (⅞ pint approx.). This quantity of stock solution contains sufficient to make 110 gallons of steep. For smaller quantities add 1 fluid ounce of the stock solution to 12 gallons of water.

Solution B, Five-minute Treatment. — Stock solution: Mercuric chloride, 200 grams (7 oz.); hydrochloric acid (conc.), 2 litres (3½ pints). This quantity of stock solution is sufficient to make 66 gallons of steep. For smaller quantities add 1 pint of stock solution to 19 gallons of water. After treatment with A the solution should be discarded; Solution B may be used three or four times before being discarded. As these solutions are corrosive and very poisonous they should be handled with care and kept away from children or stock. The use of metal implements should be avoided, as they will become corroded if allowed to come in contact with these solutions.

The mercuric chloride used should be of good quality, and the hydrochloric acid of commercial concentrated standard (31 per cent.). The cost of these substances is comparatively low, mercuric chloride being 6s. per pound, and hydrochloric acid 7s. 6d. per "winchester" of 10 lb. Thus the cost of the material required to prepare 66 gallons of Solution B is 7s. 8d., and that of Solution A 1s. 2d.

FUTURE WORK.

Further work is required to determine (1) the effects of treatments upon the tubers, and (2) the detrimental effects of the disease upon the yield. With regard to (1), it may be stated that all tubers were kept after treatment, and the production of shoots noted. In all cases where the tubers had well-developed shoots these were killed back to the tuber; but in the course of a few days further shoots developed in abundance, save in those cases where the solutions used had been acidified with 2·5 per cent. hydrochloric acid. With these, delay of a fortnight was evident, and with tubers which had been cut prior to immersion death was not infrequent. It is hoped next season to be able to carry out an extensive series of field experiments, with a view to solving these two last problems.

The writer is indebted to Mr. J. C. Neill, of this Laboratory, for assistance rendered during the course of the experiments.

CONCRETE-WORK ON THE FARM.

A. W. HUDSON, B.Ag., Assistant Instructor in Agriculture, Christchurch.

THE advantages of concrete-structure on the farm are now generally recognized, but practical knowledge of the technique of the work is often lacking among farmers. In a series of articles—now commenced—the writer proposes to give sufficient detailed information to enable any handy man to undertake the simpler structures or operations. The present instalment deals (1) with the general subject of materials, and (2) with the making of concrete posts. In subsequent articles it is proposed to treat similarly some other uses to which concrete can be put on the farm.

1. MATERIALS AND THEIR PREPARATION.

The materials used in making concrete are the "aggregate," cement, and water.

The aggregate may be natural shingle, broken shingle, crushed rock, sand, or a combination of these. It should consist of well-graded material—that is, material of all sizes between the largest stones allowed and sand. The material most commonly used is pit, river-bed, or beach shingle, and great care must be taken that there is neither clay nor vegetable matter present. If the shingle contains any soil or plant debris it must be washed free of these. A convenient form of trough for this purpose is shown in Fig. 1. The aggregate is placed in the trough and stirred thoroughly while water is run through. The lighter clay or soil particles or vegetable matter are carried out at the overflow notch.

The maximum size of stones allowed in the aggregate will depend on the nature of the work. For ordinary fencing-posts and troughs the largest stones should pass through a $\frac{3}{4}$-in. mesh screen. For posts above 8 in. by 8 in. larger stones may be allowed, but should not be larger than will pass through a screen of $1\frac{1}{2}$ in. mesh. Floors and

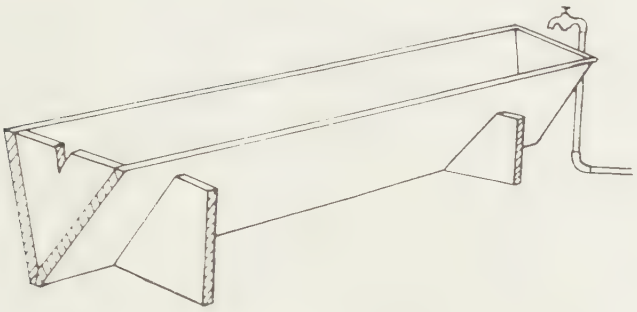


FIG. 1. TYPE OF TROUGH SUITABLE FOR WASHING SHINGLE.

paths permit the use of large shingle if their thickness is greater than about 2 in., but in general large material is not to be recommended. Where pit or river-bed shingle is used it will generally be necessary to screen the material. This may well be done at the pit or other place where the shingle is obtained, and the type of screen shown in Figs. 2 and 3 will be found very useful It may be propped up on the tail-board of a dray so that the material passing through the meshes of the screen will fall into the dray and the coarse stones back to the ground. Carting of unneeded material is thereby avoided. The wire for such a screen is obtainable already prepared at wireworking establishments.

Cement.—This must be of good quality, and must not have suffered exposure to damp. Since it is often difficult to store any quantity under the driest of conditions, it is advisable to get only as much as may be used up in a few months.

Water.—It is necessary that water should be free from acid, alkali, clay, or vegetable matter.

PROPORTIONS OF MATERIALS.

A weaker mixture than 1-6—one part of cement to six of aggregate —should not be used, except where the work is not likely to be subjected to severe strain or wear, such as in the case of bulky walls, where 1-8 can be safely employed. When washed shingle or crushed stone is used, clean, *coarse* sand in the proportion of about one of sand to two of stone must be added. This will not increase the space occupied by the stone very much, as it must be borne in mind that the sand goes to fill up the spaces among the coarse material.

Measuring of Quantities.—On the farm, measurement of quantities is most conveniently done with a kerosene or petrol tin, which holds about two-thirds of 1 cubic foot of material. A bag of cement contains $1\frac{1}{3}$ cub. ft., and therefore about two kerosene-tinfuls. The volume of the work should be measured; this will be the measure of the quantity of aggregate required (the addition of the cement to the shingle does not increase the total bulk, as the cement goes to fill up the finer spaces in the material). Suppose the volume of concrete required is 4 cub. ft.: since a kerosene-tin holds about two-thirds of 1 cub. ft., six tins of aggregate will be required. (In practice it is generally found

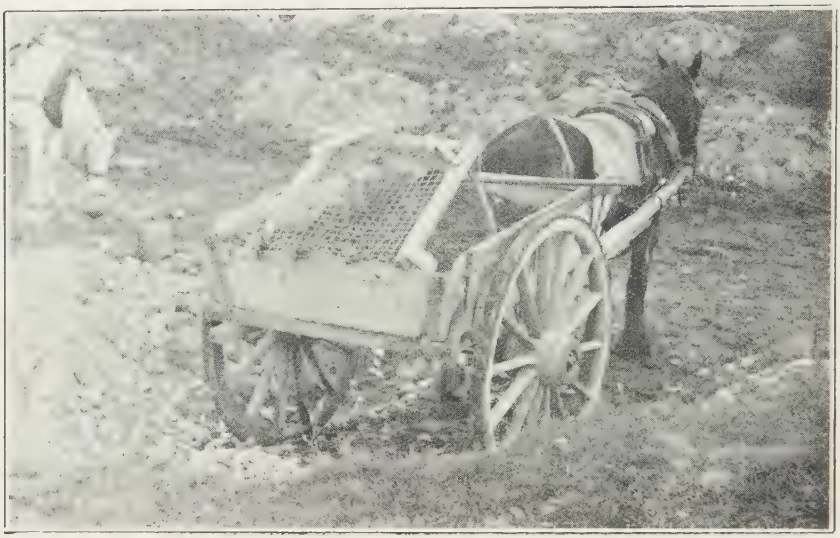


FIG. 2. METHOD OF SCREENING SHINGLE AT PIT.

Suggested dimensions for a screen such as shown are given in Fig. 3.

[Photo by A. W. Hudson.

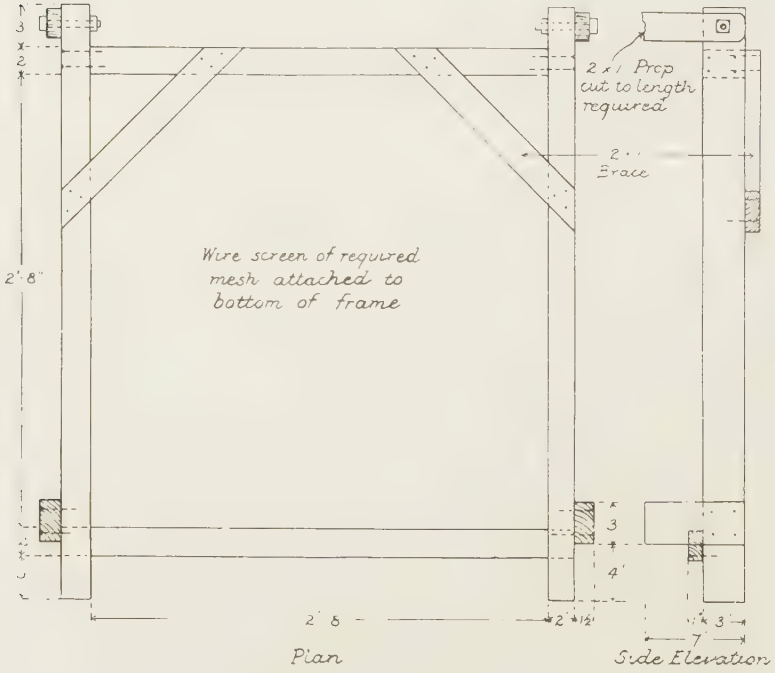


Diagram of Screen suitable for standing on dray

FIG. 3.

that in a case similar to the foregoing about six and a half tinfuls will be required. This is due to the fact that the material does not become completely packed when just thrown into the tin. A little practice will allow a very accurate estimate of the required quantity to be made.) Having measured the shingle or other aggregate, a measured quantity of cement is then emptied on the top of the heap so that it runs evenly all over it. In the example six tinfuls of the aggregate were taken, and therefore, if the mixture is to be 1–6, one tinful of cement will be required.

Mixing.—A mixing-board 8 ft. by 8 ft. square is suitable for anything up to eight tinfuls at a time. It should be made of tongued-and-grooved Oregon-pine boards, this timber being most suitable for all concrete moulds, &c., as it is less liable to warp than others. Where there is no need to shift the mixing-board a smooth concrete floor makes a very good substitute. Mix thoroughly before and after adding the water. The best mixing is obtained by having a man on each side of the heap. Shovel from the bottom, and throw the material away from the heap with a turn of the shovel, at the same time imparting a spreading movement. Turn the material in this manner at least three times before adding water. A drag with flattened tines is a very useful tool for mixing, and if its use is alternated with that of the shovel the work will be made easier. Repeat the turning operations, at the same time splashing water carefully over the new heap being formed, or using a watering-can. The water must not be added so quickly as to cause streamlets to run away from the heap, as a large amount of cement may be lost if this happens. The quantity of water necessary depends upon the wetness of the aggregate before mixing. Excess of water must be avoided, and when the concrete is so wet as to require a slight shake to dislodge it from the shovel the wetness will be right for most purposes.

So that the concrete can be used immediately, the mould must be got in readiness before mixing.

2. CONCRETE POSTS.

ORDINARY FENCING-POSTS.

Making the necessary moulds is, of course, the first step in connection with concrete posts. Drawings of a mould suitable for making tapering posts, 6 ft. long, 5 in. by 5 in. at the bottom and 5 in. by 3 in. at the top, are given in Fig. 4. This type of boxing can be used equally well for the post with parallel sides similar to that made in the mould shown in Fig. 5, or a two- or six-post mould may be preferred. If it is considered preferable to make the posts singly—as when larger posts, say, 8 in. by 8 in. in cross-section, are being prepared—then the Figs. 6 and 7 type is extremely useful. Instead of the dowels, strips may be fastened on the base-board to keep the sides from bulging; or two iron pins passing through holes in a cross-piece which rests on the top of the mould, fitting into holes in the base-board, make a very convenient arrangement for this purpose (Fig. 6). Since the dowel-holes tend to become filled with cement, this method of holding the mould in position is probably the better one.

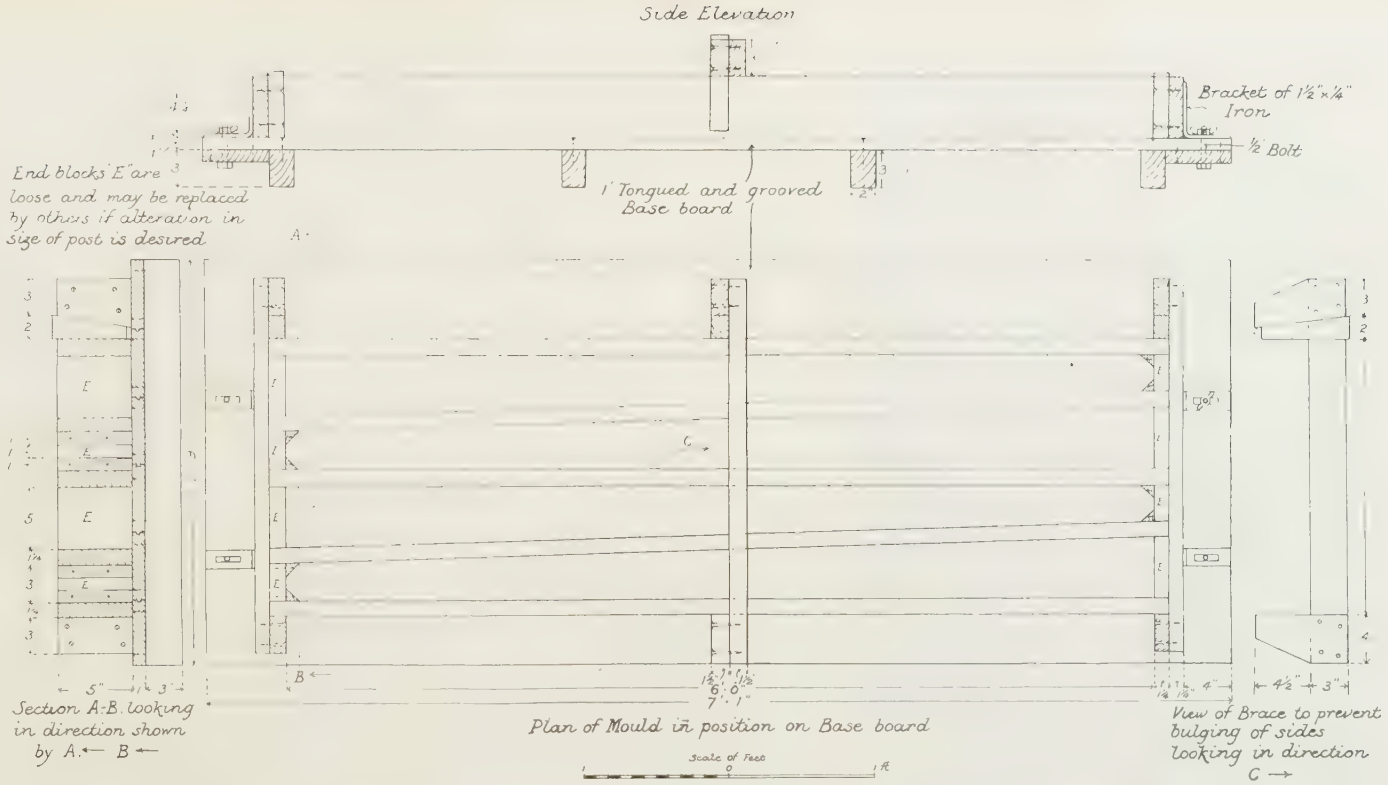

Side Elevation
Bracket of 1½"×¼" Iron
½ Bolt
End blocks 'E" are loose and may be replaced by others if alteration in size of post is desired
1" Tongued and grooved Base board
A
B
C
E
5"
3"
4½"
4"
6'. 0"
7'. 1"
Section A:B. looking in direction shown by A.→ B ←
Plan of Mould in position on Base board
View of Brace to prevent bulging of sides looking in direction C →
Scale of Feet

Diagram of Mould & Base board for making Posts 6' long, 5"×5" bottom and 5"×3" top.

Timber:– Dressed Oregon Pine. Measurements refer to the size of timber in the rough state.

FIG. 4.

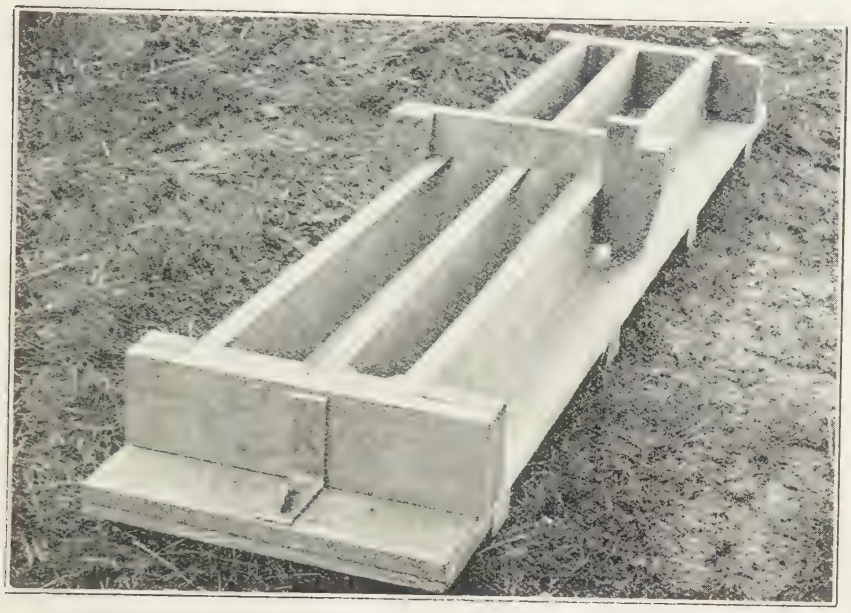


FIG. 5. TWO-POST MOULD OF SIMILAR DESIGN TO THAT GIVEN FOR THE FOUR-POST MOULD (FIG. 4).

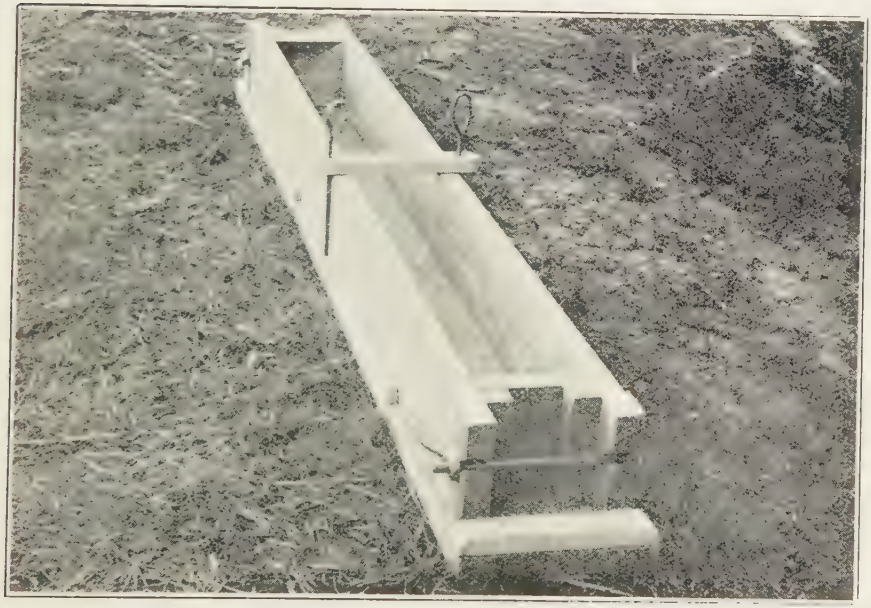


FIG. 6. MOULD SIMILAR TO THAT SHOWN IN FIG. 7 (SEE NEXT PAGE), BUT WITH CLEATS AND IRON PINS INSTEAD OF DOWELS.

[*Photos by A. W. Hudson.*

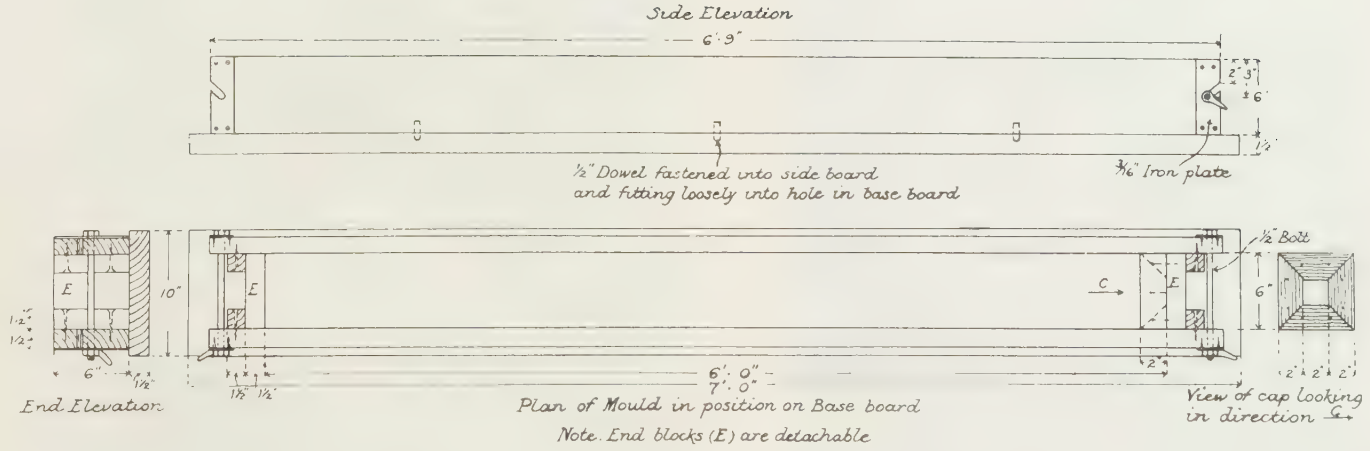


Diagram of Mould and Base board suitable for making Posts 6"×6"×6'
timber – Dressed Oregon Pine. Dimensions given are those of timber before dressing

FIG. 7.

Method of Preparing and Filling Moulds.

Cover the base-board with a sheet of plain galvanized iron, or with paper, or paint with any one of the following: (1) Waste oil (such as that from the crank-case of an engine); (2) clay and water made into a pasty solution; (3) whitewash. The portion of the mould coming in contact with the concrete must then be painted with any of these materials and placed in position on the base-board. Wet the mixture, and mix it thoroughly. Lay about 1 in. of concrete in the bottom of the mould, and tamp with a wooden rammer similar to that shown in Fig. 8. Next place two reinforcing-rods (previously prepared) with about 1 in. or 2 in. of their ends bent at right angles, and extending to within about $\frac{1}{2}$ in. of the ends of the mould, on the thin layer of concrete (for position of reinforcing-rods see Fig. 9—important). Now

FIG. 8. TYPE OF RAMMER RECOMMENDED FOR MAKING POSTS.

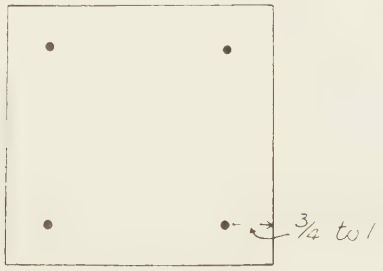


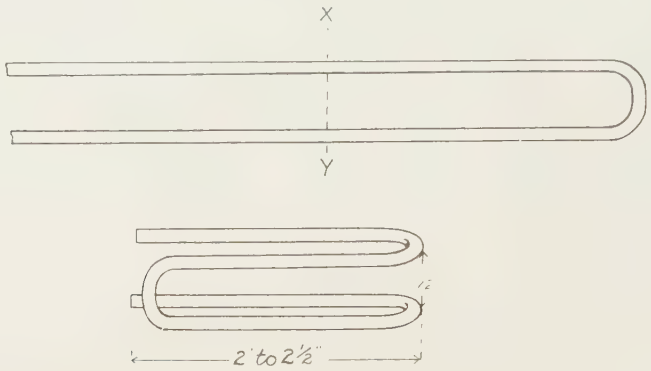
FIG. 9. TRANSVERSE SECTION OF POST, SHOWING POSITION OF REINFORCING-RODS.

fill the moulds to within about $\frac{3}{4}$ in. of the top, being careful to tamp thoroughly as the concrete is put in in thin layers. Place two other reinforcing-rods in position with the bent-over ends turned towards the centre of the post, fill in to the top of the mould, and finish the surface with a trowel.

The next operation is to fix in the wire staples shown in Fig. 10, so that the end with the double loop protrudes about $\frac{1}{2}$ in. This must be done immediately the concrete is in position, and fine material carefully tamped around the staples. A rod of wood marked with the required spacing will serve as a guide to the position of the staples.

In addition to the wire staples, holes through the post should be provided, because the life of the staples is limited, and when they rust away the post is likely to be better than ever. These holes may be made in the desired position by placing $\frac{1}{4}$ in. iron rods through the mould

from side to side before the concrete is put in. The rods must be removed before the concrete hardens, usually about two hours after placing it in the moulds. This method cannot be adopted in making tapering posts unless no more than two posts are made in the one mould.



Method of making double staple for attachment of wires
A second bend is made at X.Y. No. 8 wire is used

FIG. 10.

Removal of Moulds.

The moulds may be removed about three or four hours after the concrete has been laid. The method adopted at Lincoln College, where the type of boxing shown in Fig. 4 is used, is as follows: The end boards and blocks and outside boards are first removed; then two parallel boards attached by iron hoops (Fig. 11) are placed so that they lie along the edges of two adjacent posts and astride the dividing-board of the mould. The boards are held firmly, but without undue pressure, and by means of a tool such as a screwdriver the ends of the dividing-board is levered up just a sufficient amount to allow a hooked iron rod to be placed under it. Keeping the parallel board firmly in position, the dividing-board is then lifted right up and removed. If this operation is not performed at about the time stated it will be necessary to leave the dividing-boards of the mould in

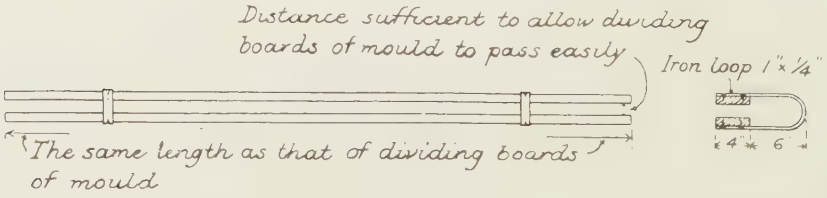

Distance sufficient to allow dividing boards of mould to pass easily
Iron loop 1" x ¼"
The same length as that of dividing boards of mould
4
6

FIG. 11. PARALLEL BOARDS USED IN REMOVAL OF MOULD.

position until the posts themselves can be moved. On no account must the posts be moved until four or five days have elapsed. They may then be lifted carefully, supported in the middle as well as at the ends, and should be laid carefully on sand or loose earth unti mature. A stout plank makes a convenient carrier for the posts, and prevents any tendency for them to sag in the middle.

STRAINERS.

For a good strainer, which can be used also as a gate-post, the following is recommended: Type of mould as in Fig. 7; dimensions, 8 ft. by 8 in. by 8 in.; reinforced with $\frac{3}{8}$ in. or $\frac{1}{2}$ in. round iron. When the post is required as a strainer a notch to take the ends of the stays is made by bedding a wedge-shaped piece of wood of the required size into the face of the post as soon as it is moulded.

LARGE GATE-POSTS.

The mould for making these is shown in Fig. 12, and the method adopted in building one is as follows: The position in which the post is to stand is carefully determined. A hole, 3 ft. to 3 ft. 6 in. deep and about 16 in. square, is dug. The base of the mould is then set in position over the hole and carefully levelled. Reinforcing-rods of $\frac{1}{2}$ in. or $\frac{3}{8}$ in. iron, long enough to reach from the bottom of the hole to the top of the post, and which may be held at the correct distance apart by a wooden frame or by strong wire (the latter can be left attached to the rods) twisted round them, are next placed in the hole, and the concrete filled in to the top of the base. The mould proper is then placed in position and fastened to the base by means of the brackets and thumb-screws shown in the diagram: it is carefully plumbed and held firmly in position by two temporary stays connecting the mould with pegs firmly driven into the ground. While the mould is being filled the concrete should be well tamped with an oar-shaped rammer, especially around the sides. If this is done and there is sufficient sand in the aggregate a very smooth surface will result.

As soon as the mould is filled the cap is put on. This may be of any desired shape. The small drawing annexed to Fig. 12 gives dimensions for a pyramid-shaped cap, which is made two or three days before the post. Short wires are inserted into it, and when the cap is put in position these serve to tie it to the post. The cap-mould shown consists of a square frame with a pyramid-shaped mould (shown in section) within it. An alternative method of putting on the cap is to prepare a strong mixture (1–2 or 1–3) of cement and sand, which is made fairly stiff, and simply placed on top of the post and moulded into the desired shape. This is a slower method than the one first described.

The post-mould may be removed with safety in about two days, and if the post is then painted over with pure cement mixed into a paste with water a very good finish will result. A pure-white cement may be procured for such work as this if a better appearance is desired.

The hinge fasteners which have given best results at Lincoln consist of a three-sided bracket with the ends rounded and threaded. The fourth side has two holes bored in it, and carries the hanger for the hinges. The threaded ends of the three-sided piece pass through

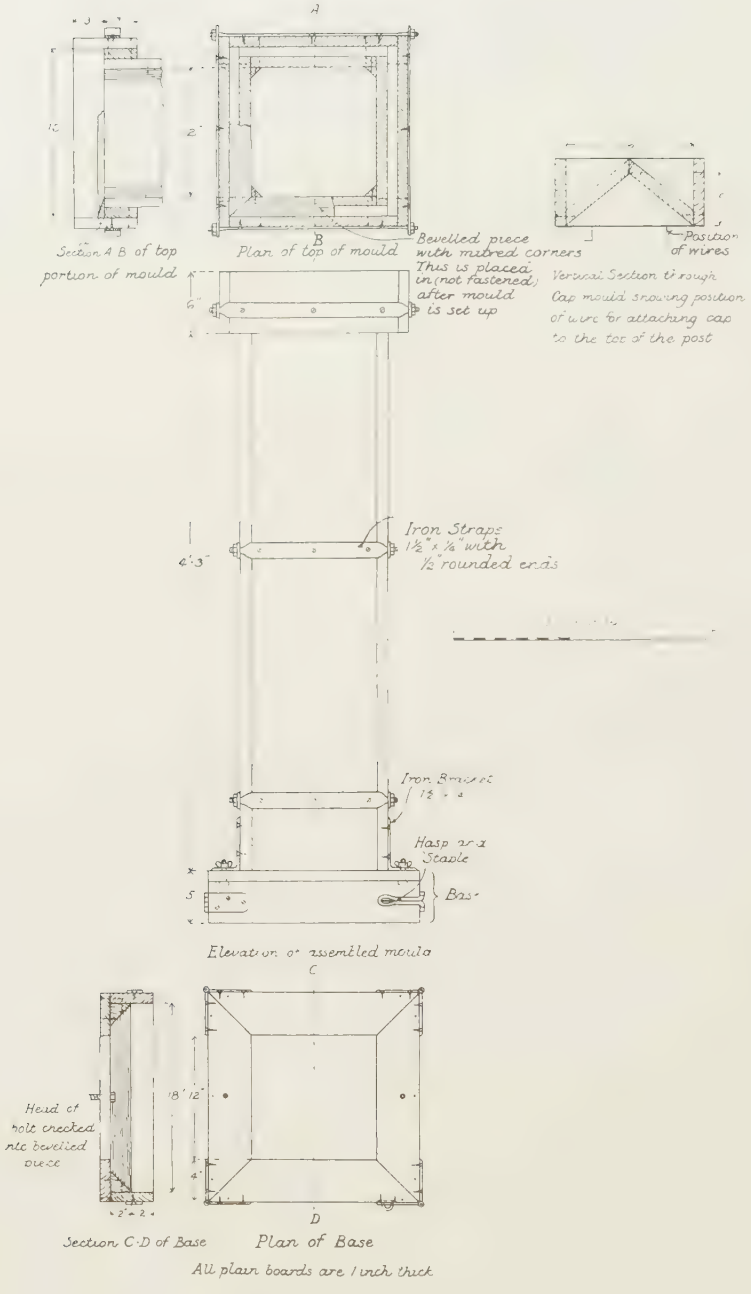

A
B
Section A B of top portion of mould
Plan of top of mould
Bevelled piece with rubred corners This is placed in (not fastened) after mould is set up
Position of wires
Vertical Section through Cap mould showing position of wire for attaching cap to the top of the post
Iron Straps 1½" x ⅛" with ½" rounded ends
4'-3"
Iron Brace of 1½" x
Hasp or Staple
Base
Elevation of assembled mould
C
D
Head of bolt cracked nic bevelled piece
18" 12"
Section C D of Base
Plan of Base
All plain boards are 1 inch thick

FIG. 12. MOULD FOR LARGE GATE-POST.

the holes, and the whole is fastened securely by nuts (Fig. 13). The type of gate-fastener to be used should be decided on beforehand, and a hole made in the boxing for its insertion.

STAYS.

Stays may be made any size. Those used at Lincoln are 8 ft. long and 4 in. by 2 in. in cross-section, and reinforced with two pieces of No. 6 wire near the top and bottom edges. Two are used, placed side by side and ½ in. apart. The fence-wires pass between them and are then fastened round the post (see Fig. 14).

It is a good plan to have a few old kerosene-tins on hand whenever mixing is being done. If there is any surplus material it can be put into such tins, and the blocks formed used to butt the stays against.

BEVELLING.

It is good practice to bevel the corners of posts, so that if they are struck the possibility of a piece being chipped out is lessened, and a heavy blow, unless striking the post squarely, would more easily glance off. Bevelled strips can be placed in the mould for the bottom corners of the post, and a trowel may be used to bevel the corners lying uppermost.

SEASONING OF POSTS.

Posts, and indeed any concrete-work, should be dried slowly. Therefore keep posts covered with wetted bags or other material for about two weeks, and even after this the drying must be slow. From three to six months must be allowed before the posts are used.

Concrete-work must be protected from extremes of heat and cold. If protection cannot be provided no attempt should be made to work in very hot or in frosty weather.

REINFORCING.

Reinforcing-material may be used as follows:—

Tapering posts (Figs. 4 and 16) ..	Four rods of No. 6 wire or ¼ in. round iron.
6 in. by 6 in. posts (Figs. 6 and 15)	Four rods of ¼ in. or ⅜ in. round iron.
8 in. by 8 in. post	Four rods of ⅜ in. or ½ in. round iron.
12 in. by 12 in. gate-post ..	Four rods of ½ in. or ⅝ in. round iron.

The reinforcing-rods must run nearly the full length of the posts.

FENCES.

The fence shown in Fig. 15 is constructed of 6 in. by 6 in. posts placed about 1 chain apart. Wooden droppers are fastened to the wires about every 6 ft. The spacing of the wires is approximately as follows: From the top of post to barbed wire, 3 in.; from barbed wire to first plain wire, 10 in.; from first plain wire to second plain wire, 7 in.; from second plain wire to third plain wire, 6 in.; from third plain wire to fourth plain wire, 5 in.; from fourth plain wire to fifth plain wire, 5 in.; from fifth plain wire to sixth plain wire, 5 in.; from sixth plain wire to ground-level, 5 in. This fence may be considered suitable for holding any kind of ordinary stock. The droppers are hung so as to clear the ground, and the fence swings on any attempt being made to get through it. This is generally sufficient to frighten stock away.

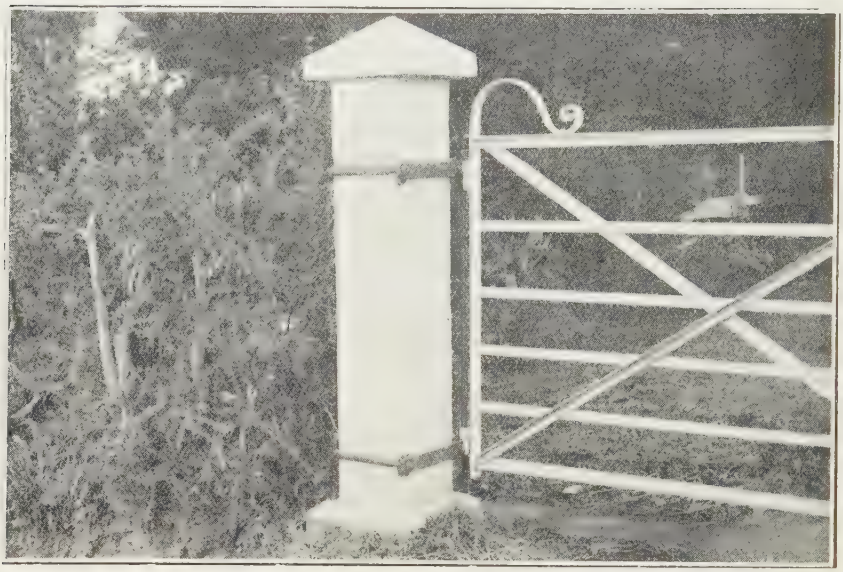


FIG. 13. 12 IN. BY 12 IN. GATE-POST MADE IN A MOULD VERY SIMILAR TO THAT OF FIG. 12.

Note method of hanging the gate.

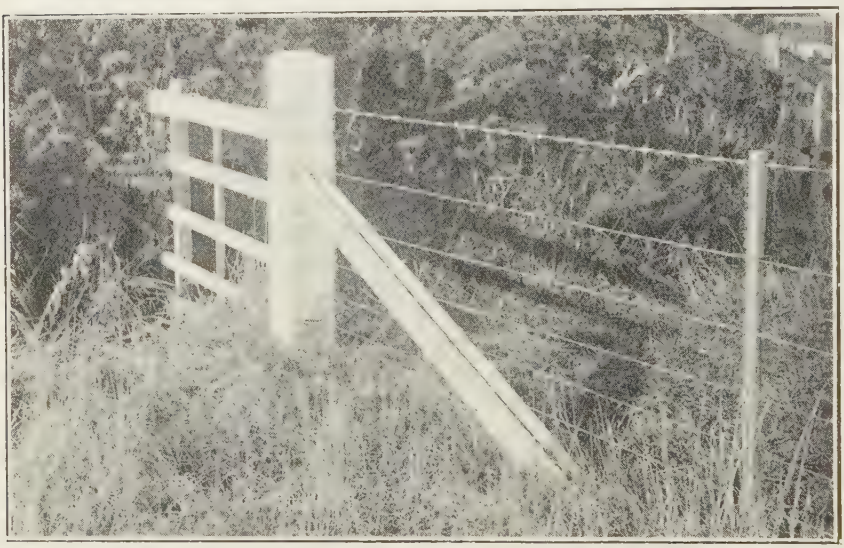


FIG. 14. 8 IN. BY 8 IN. STRAINING-POST, SHOWING METHOD OF USING DOUBLE STAYS OF 4 IN. BY 2 IN. REINFORCED CONCRETE, WITH FENCE-WIRES PASSING BETWEEN.

[*Photos by A. W. Hudson.*

FIG. 15. SWING FENCE, WITH POSTS 6 IN. BY 6 IN. IN CROSS-SECTION, 1 CHAIN APART, AND 2 IN. BY 1 IN. WOODEN DROPPERS EVERY 6 FT.

[*Photo by F. E. Ward.*

The tapering posts (Fig. 16) are placed much closer than in the fence just described. Their distance apart is from 5 yards to 6 yards, with droppers between. They cannot be recommended for horse or cattle fences unless more strongly reinforced. Half a chain should not be too great a distance between such posts where the fence is intended for sheep.

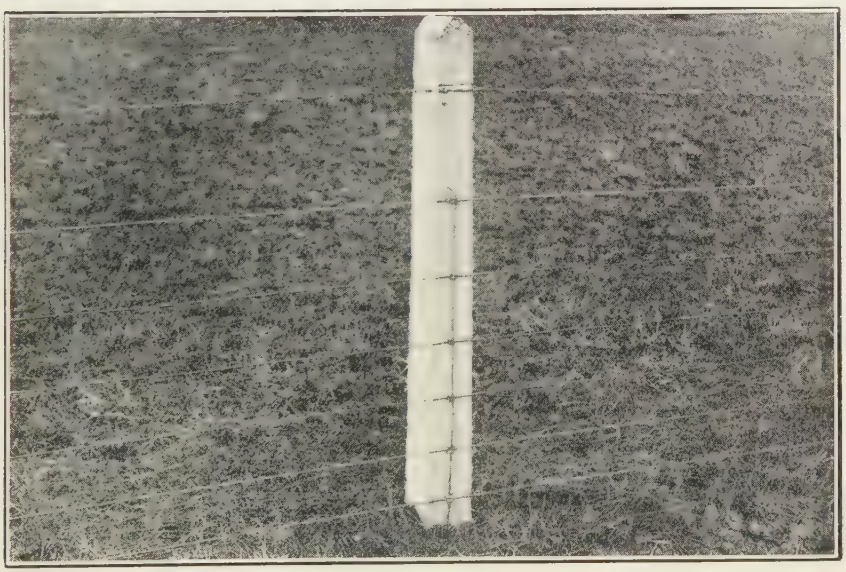


FIG. 16. TAPERING POST.

Note method of fastening the wires. Each fence-wire passes through the loop of the "staple" (see Fig. 10), and is held in position by a No. 8 wire dropper which passes through the loops.

[*Photo by A. W. Hudson.*

TIMBER REQUIRED FOR MOULDS.

Portion of Mould for which required.	Dimensions of Cross-section.	Number of Pieces required.	Length of each Piece.	Total Length.	Number of Superficial Feet.
(1.) For Mould shown in Fig. 4.					
	Inches.		Ft. in.	Ft.	
Bearers of base-board and brace (not necessarily dressed)	3 x 2	5	2 9	14	7
Long boards of mould	6 x 1½	5	6 0	40	30
End boards and blocks (off-cuts here will make stops for ends of brace)	6 x 1½	4	2 6	..	..
Tongued-and-grooved base-boards ..	6 x 1	6	7 0	42	21
Total superficial feet	..	..	..	..	58
(2.) For Mould shown in Fig. 7.					
Side boards and end blocks	6 x 1½	2	8	16	12
Base-board	10 x 1½	1	7	7	10¾
Total superficial feet	..	..	..	..	22¾
(3.) For Single Mould to make 8 in. by 8 in. Strainer or Gate Post.					
Side boards and end blocks	8 x 1½	2	20	20	20
Base-board	12 x 1½	1	9	9	13½
Total superficial feet	..	..	..	..	33½

In estimating quantities it will be seen that in the case of material for mould Fig. 4 standard sizes of timber have been allowed for: *e.g.*, instead of 5 in. by 1¼ in. for the long boards and ends of mould, 6 in. by 1½ in. is reckoned on. Tongued-and-grooved boards are not sold by the superficial foot, but by the "running" foot. This will affect the calculation of cost very slightly.

COST OF TAPERING POST AS MADE IN MOULD SHOWN IN FIG. 4.

Mould.

Dressed Oregon pine (first class) costs at the present time about £3 per 100 superficial feet.

	£ s. d.
58 sup. ft. at £3 per 100	1 14 10
Four iron brackets and bolts, with thumb-screw and wood screws ..	0 10 0
Cost of labour for making	0 10 0
Total cost of boxing	£2 14 10

Assuming that such a mould can be used one hundred times, the cost allocated to each post will be 54s. divided by 400, or just over 1½d. A mould well cared for and kept under cover when not in use will give considerably more service than the figure given. At Lincoln some moulds have been in use off and on for a period of twelve years.

Concrete-work.

It is here assumed that shingle costs the farmer 10s. per yard. Considering that such work as carting can be done when horses cannot

be used on the land, it seems hardly fair to charge even this amount. In any case a little consideration will show that even if the cost of shingle is twice the amount stated the increase in the cost of the post will not be great.

Cement and shingle: 1 yard of shingle is sufficient for making thirty-two tapering posts. Cement costs about 7s. 3d. per bag at main centres.

	£	s.	d.
1 yard shingle	0	10	0
3½ bags cement (1–6 mixture)	1	5	4
For thirty-two posts	£1	15	4

The cost of cement and shingle for one post equals 1s. 1¼d.

Reinforcing: 1 cwt. No. 6 galvanized wire costs 25s. There are about 383 yards in 1 cwt.; therefore 1 ft. costs about ¼d., and 24 ft. (amount required for one post) 6d.

Labour: With three sets of six-post moulds three men can make eighteen posts in half a day. Allowing 12s. per day per man, the cost of labour per post is 1s.

Summary of Cost.

Mould, to be charged per post, 1½d.; cement and shingle, 1s. 1¼d.; reinforcing, 6d.; labour, 1s: total cost per post, 2s. 8¾d. This does not allow for removal and clearing of moulds, which involves only a small amount of labour.

COST OF 6 FT. BY 6 IN. BY 6 IN. POST (FIG. 7).

Mould.

	£	s.	d.
22¾ sup. ft. at £3 per 100	0	13	8
Iron plates and bolts	0	7	6
Labour for making	0	5	0
Total cost of mould	£1	6	2

If used one hundred times, the cost to be charged per post is 3d.

Concrete-work.

Cement and shingle: 1 yard of shingle will make eighteen of these posts.

	£	s.	d.
1 yard shingle	0	10	0
3½ bags cement	1	5	4
For eighteen posts	£1	15	4

Cost of cement and shingle for one post, 2s.

Reinforcing: ⅜ in. round iron, 24s. per cwt.; 1 cwt. approximately 300 ft.; therefore cost of 1 ft. is 1d. approximately, and 24 ft. costs 2s.

Labour: Three men can make twelve posts in half a day; at 12s. per day per man, the cost of labour per post is 1s. 6d.

Summary of Cost.

Mould to be charged, per post, 3d.; cement and shingle, per post, 2s.; reinforcing, per post, 2s.; labour, per post, 1s. 6d.: total cost of post, 5s. 9d.

COST OF 8 FT. BY 8 IN. BY 8 IN. STRAINER-POST.

Mould.

	£	s.	d
33½ sup. ft. at £3 per 100	1	0	0
Iron plates and bolts	0	7	6
Labour for making	0	5	0
Total cost of mould	£1	12	6

If used one hundred times, cost to be charged per post is 4d.

Concrete-work.

Cement and shingle: 1 yard of shingle will make about seven and a half posts. 1 yard shingle and 3½ bags cement cost £1 15s. 4d.; therefore cost of cement and shingle per post is 4s. 9d. approximately.

Reinforcing: ½ in. round iron at 22s. 6d. per cwt.; 1 cwt. = 171 ft.; therefore cost of 1 ft. = 1⅗d., and 32 ft. = 4s. 3d.

Labour: Three men can make six posts (probably more) in half a day. The cost of labour per post is thus 3s.

Summary of Cost.

Mould, per post, 4d.; cement and shingle, 4s. 9d.; reinforcing, 4s. 3d.; labour, 3s.: total cost of post, 12s. 4d.

COST OF 12 IN. BY 12 IN. GATE-POST (FIG. 12).

Mould.

This cost must necessarily be approximate only, because only one or two such moulds would be required, and for the purchase of small quantities of timber of suitable dimensions the cost would undoubtedly be greater in proportion than if a large amount was ordered.

	£	s.	d.
About 30 sup. ft., say	1	0	0
Iron straps, hinges, &c.	1	0	0
Labour	0	15	0
Total	£2	15	0

Concrete-work.

In this case the position in which the post will stand must determine the labour required in getting material to the spot. Therefore only the actual cost of shingle, cement, and reinforcing is shown. Also it must be remembered that the post is built in position, so that the labour of placing it occurs during the making. If a hole 3 ft. 6 in. deep and 18 in. square is made, about ½ yard of shingle is necessary.

	£	s.	d.
½ yard shingle	0	5	0
About 1⅔ bags cement at 7s. 3d.	0	12	0
Four reinforcing-rods, 9 ft. long, ⅝ in. diameter ..	0	7	4
	£1	4	4

(To be continued.)

AMERICAN FOUL-BROOD IN BEES AND ITS TREATMENT.

E. A. EARP, Senior Apiary Instructor, and G. V. WESTBROOKE, Apiary Instructor.

FOUL-BROOD is the name given to certain diseases which attack bees in the brood or larval stage. American investigators have determined three types of foul-brood, of which the most destructive to bees in this country is that caused by *Bacillus larvæ* (White), and named American foul-brood. No investigations have yet taken place to determine the possible presence of the other two brood diseases—European foul-brood, caused by *Bacillus pluton*, or sac-brood, caused by a filterable virus. Almost every season beekeepers note and report diseased conditions of the brood of which they have no knowledge, and which differ from the usual appearance of the brood when attacked by *Bacillus larvae*. These cases are not serious, as they are never reported in epidemic form, the colonies generally regaining form during the summer.

Since foul-brood causes a large annual loss of colonies and the destruction of an extensive amount of beekeeping equipment, it may be considered a very serious menace to honey-production in the Dominion. Greater efforts are now being made to control its spread through education and a more rigid enforcement of the Apiaries Act. The disease is found in the North and South Islands. Although certain areas have been rendered free from it, how long they will remain so will depend upon whether diseased colonies or infected material are introduced. The rapidity with which the disease spreads from place to place tends to dishearten beekeepers, and it is only by constant vigilance and the application of precautionary and curative measures that immunity from the dread disease can be won.

The precise date at which foul-brood made its appearance in New Zealand is not known. For some years prior to 1907 beekeepers were troubled with serious losses among their bees, and in that year samples of comb submitted to the United States Department of Agriculture for examination were reported upon as showing the gross characteristics of American foul-brood.

CAUSE AND SYMPTOMS.

The disease invades the colony by attacking the young larvæ during the time when they are being fed by the nurse bees, and the infected larvæ usually die just after the cells are capped over. The bees allow the resulting matter to remain there, and the number of hatching-bees decreases in proportion to the increase in the number of affected cells. Larvæ of the queen, worker, and drone may become infected, although the worker larvæ are more frequently affected by the disease. Adult bees are immune. The life of the worker bee is estimated in the summer at from six to eight weeks, and it is natural to find that as the disease advances the colony dwindles in numbers until it eventually dies out. The honey that is left in the combs is carried away by bees from other colonies, which also become infected and eventually die.

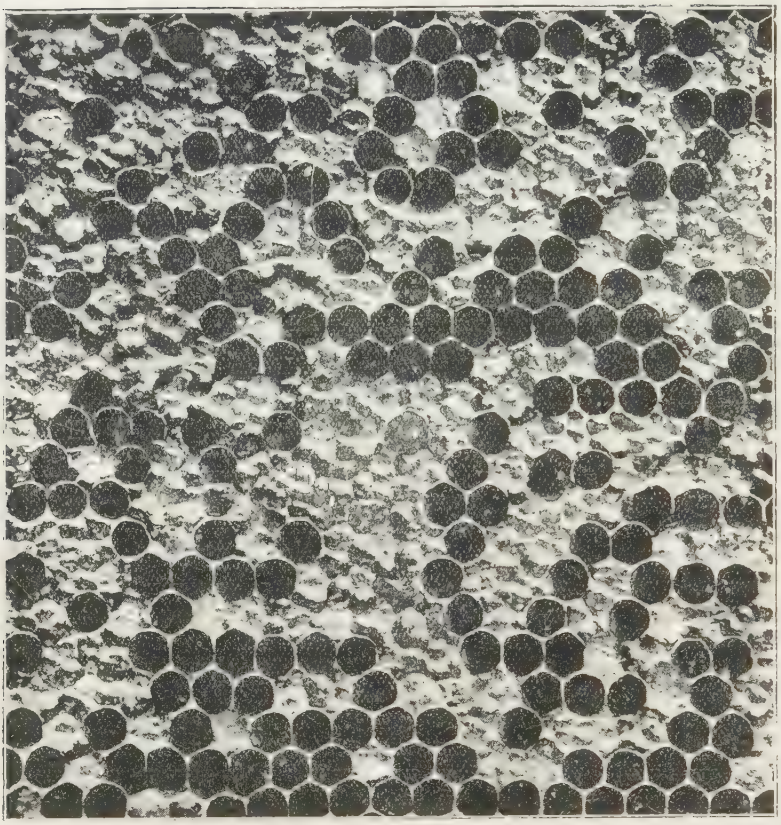


FIG. 1. PORTION OF COMB INFECTED WITH FOUL-BROOD. NATURAL SIZE.

Foul-brood is usually brought into the hive in the honey obtained from a previously infected source. The spore or bacillus finds its way into the alimentary canal of the larvæ along with the food or chyle, and at once begins to increase at an enormous rate until all the available nutriment for its development is used up. The larva in the early stages of the disease assumes an unnatural position. The colour also changes from a pearly-white to a dirty-yellow, and eventually to a dark-brown, sticky, putrid mass. During these stages the smell is usually of an objectionable character, resembling very closely the odour given off by hot glue. In cases where the larva has died after being capped over, the cappings are an indication of the disease contained in the cell. They will be found to be sunken or concave, dark in colour, greasy in appearance, and in some instances perforated. This, however, is not always the case. The cappings over the cells containing healthy brood are usually convex. A good queen lays her eggs in circles, and the fact of a single cell remaining unhatched is suspicious. If allowed to take its course the disease spreads rapidly to surrounding cells and combs, till finally no brood can hatch and the colony succumbs. On opening some of the cells a thin glue-like

coffee-coloured mass will be noticed, which on the insertion of a splinter of wood adheres to the point, and can be drawn rope-like for some little distance out of the cells. This is one of the most distinctive features of foul-brood prevalent in many countries, and, where present, it is considered conclusive evidence of the disease.

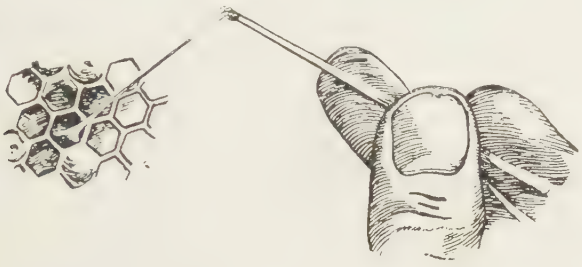


FIG. 2. SHOWING ROPY NATURE OF AMERICAN FOUL-BROOD.

[*U.S.A. Bulletin 442.*

Later on this glue-like substance dries up into the before-mentioned black, scale-like body. When the scale is scraped off and held to the nose a strong objectionable smell can be detected. Some beekeepers may fall into the mistake of supposing a colony to be clean when there is no objectionable odour, but the foul-brood must be in an advanced stage before this is noticeable. It is through honey being put into these cells that it becomes a source of infection, and, however little disease there may be in a colony, the honey in the hive is liable to contain the germs of disease. Uncapped diseased cells may easily pass unnoticed, especially when the comb is empty and there are no capped cells to betray its presence. To detect the disease in such a case, stand with the sun shining over the shoulder from behind and hold the comb horizontally with the top bar towards the body. The light will strike on the lower side of the cells and will show up the dried scales of disease.

SOURCES OF INFECTION.

Foul-brood is highly infectious, and is spread chiefly by the robbing of diseased colonies, honey being the chief agency by which the disease is transmitted from colony to colony. When a diseased colony becomes too weak to defend its stores it is liable to be robbed out by bees from healthy colonies, and in this way the germs of disease are carried. The principal causes of infection may be stated as follows: (1) Healthy colonies robbing infected colonies; (2) the acquisition of infected swarms, colonies, hives, and appliances; (3) supplying bees with honey or combs from an infected colony; (4) indiscriminately manipulating first diseased and then healthy colonies without taking proper precautions to disinfect the appliances used.

BASIS OF TREATMENT.

Bees may be successfully treated during any period of the honey-flow, but the most desirable time is shortly after the beginning of the main flow. At this time there is little danger of robbing. In

the colder months, if diseased colonies are detected, the bees should be put on clean drawn-out combs, fed on warm syrup or frames of honey from a clean hive, and left until the spring. Although this operation may not effect a cure, it acts as a temporary check to the disease, and removes the possibility of an outbreak of the trouble being transmitted to other colonies should robbing take place. When this instruction is followed the colony requires to be marked for examination when the first spring work is undertaken.

Experience has proved the efficacy of the McEvoy treatment all the world over, and it is strongly recommended by this Department. When treating a colony it is necessary that there be sufficient bees to form an average-sized swarm. Where the disease is so far advanced as to have left few bees in the hive, then it would be safest to destroy the bees and bee-combs by fire. Tinkering with such a colony would be both useless and dangerous.

Preferably the treatment should be done in the evening, but this is not always possible. When hives are in close proximity to those about to be treated it is safer to close their entrances. This will prevent the bees from the diseased hive gaining admission, and also stop robbing. Prepare a set of frames with a ½ in. strip of foundation wax (called a starter) in each. Next place these frames into an empty body ready to receive the bees. Shift the diseased hive to one side, and place the prepared hive containing the starters on the old stand previously occupied by the diseased colony. The combs with adhering bees are then removed one by one, every bee being brushed off into the prepared hive. The diseased combs are put into a spare hive-body, and covered up as quickly as possible; then remove every portion of the infected hive, including the diseased combs, out of reach of the bees. In four days' time the frames containing the starters are removed from the prepared hive and full sheets of foundation put in their place. The bees must be brushed off quickly and quietly without using much smoke, so that they get very little of the infected honey that has been stored in the combs built from the starters. The fore-going treatment, if carried out carefully and according to instructions, will effect a complete cure. This is accomplished by the bees utilizing the diseased honey in their honey-sacs for the purpose of comb-building; thus when shifted again at the end of four days they start clean. The colonies should then remain healthy unless further infection be gathered from an outside source.

SAVING HEALTHY BROOD.

When there is a large amount of healthy brood which is only slightly infected the hospital treatment may be followed with advantage. Place a queen-excluder over a strong, slightly infected colony, above which supers containing infected brood are placed. The excluder prevents the queen from making use of the affected combs while the brood is emerging. In fourteen days most of the brood will have hatched out, after which the supers can be removed and the combs stored in a place of safety until ready to melt up or destroy. Now proceed to treat the colony as previously explained. In cold weather

do not tier up too high, as there will not be sufficient bees to take care of the brood, and some of it may be chilled. If the disease reappears it should be treated again.

It must be remembered that hospital colonies are extremely dangerous, and are likely to be a continual source of reinfection. They should be placed at some distance from the main apiary, and the greatest care exercised while they are in use. The hive-bodies must be bee-tight except for the entrance, and they should be treated before the main honey-flow ceases.

INFECTED MATERIAL.

The combs, if not too badly infected, may be melted into wax, or, if insufficient in quantity for that purpose, they and their frames had better be burned and the ashes buried. Where the beekeeper decides to convert his combs into wax, the utmost care should be taken to destroy by fire all refuse. The ashes and water should be put into a deep hole and buried.

The hives and appliances may be treated by boiling in a strong solution of caustic soda and water, or, if preferred, the inside of the hives may be scorched with a painter's blow-lamp.

As already mentioned, the beekeeper himself is often the cause of spreading disease by carelessly manipulating foul-broody colonies and then healthy ones. Prevention is better than cure. It is therefore recommended that he should disinfect his hands and appliances with any of the well-known germicides.

NOTES AND CAUTIONS.

On no account should honey be fed to bees; sugar syrup is cheaper and better. Honey from diseased hives may be used for table purposes.

Take the precaution to dig round about the hive so as to bury any honey which may have been spilt.

No treatment will be successful when the bees are allowed to get at any of the combs or honey from an infected hive.

"Eternal vigilance" should be the watchword of every beekeeper who hopes to control diseases.

Combs should not be exchanged from one hive to another until the apiary is free from disease.

Occasionally colonies swarm out after treatment, but this is not likely to occur when honey is being gathered freely. It can be guarded against by placing queen-excluding zinc across a wide entrance until there is brood in the combs.

All swarms from an infected apiary should be treated as if they were diseased.

Keep robbing in check as much as possible.

Should the weather be unfavourable for honey-gathering, it is advisable after treatment to feed a little sugar syrup.

Do not wait until the winter to melt up the wax and clean the combs. Do it at once.

Diseased combs should be immediately removed, so as to avoid reinfection.

TESTING OF PUREBRED DAIRY COWS.

JANUARY CERTIFICATE-OF-RECORD LIST.

W. M. SINGLETON, Director of the Dairy Division, Wellington.

With the exception of a few uncompleted returns, this month's list—which gives particulars of certificates issued in January—finishes the publication of records for C.O.R. cows qualifying during the calendar year 1924.

Many good performances appear. Among them is the senior four-year-old Friesian, Hinemoa Beauty, owned by Mr. T. R. Eades, of Edendale. She was on test last year, when she qualified for a certificate on a yield of 812·44 lb. fat. This year her record stands at 822·37. That is to say, in two consecutive seasons she has averaged, on C.O.R. test, 817·40 lb. of butterfat.

At the head of this month's list for mature Friesians is Lady Zozo Alcartra van Racelands, with 832·59 lb. butterfat. She was tested by Messrs. C. W. Baldwin and Son, Ngatoro, Inglewood, and at the conclusion of her testing-period was purchased by John Court (Limited) for the J. C. L. Hobson Farm, at Panmure, near Auckland.

The outstanding Jerseys of the current list are both owned by Mr. A. E. Watkin, Takanini. Lady's Perfection, a four-year-old, has been issued a certificate on 770·20 lb. butterfat; and Mystery's Golden Girl, a mature cow, produced 753·73 lb. butterfat.

The chief feature of the present list, however, is the appearance of two new class-leaders, both in the Milking Shorthorn breed. Dominion Esau of Ruakura adds yet another name to his steadily increasing list of distinguished daughters. In last month's *Journal* reference was made to Matangi Violet 2nd as a new leader of the Milking Shorthorn senior four-year-olds (621·54 lb.). Matangi Ruth 2nd (half-sister) has since completed her C.O.R. test with a yield of 644·90 lb., and thus moves to the head of her class. She also heads the senior three-year-old class on her last season's production of 747·86 lb. Both cows were tested by Messrs. Ranstead Bros.

The other change in class-leadership for the Milking Shorthorn breed occurs in the mature class. The good record which Maniaroa Princess made during the 1919–20 season has at last been broken by Mr. A. J. Melville's Glenthorpe Lady, who goes to the head of the class. Her fine yield of 856·85 lb. butterfat surpasses that of the previous leader by no less than 156 lb. butterfat. Glenthorpe Lady is one of the older generation, and neither her exact age nor her pedigree appears in the Herd-book. This latest record is the third performance in which she has qualified for a certificate of record. Her first season on C.O.R. test was in 1920–21, when in the mature class she yielded 550·05 lb. She was then rested a season, and in 1922-23 was credited with 671·63 lb. When to these are added her last season's figures—856·85 lb. butterfat—it must be admitted that Glenthorpe Lady has proved her capabilities as a producer.

In the same class of the current list appears Mr. Melville's Glenthorpe Daisy, with 694·10 lb. This cow also has two previous records—one of 519·46 lb. and another of 674·46 lb.

LIST OF RECORDS.

* Cow milked three times daily during whole lactation period. † Milked three times daily during part of period.

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
	JERSEYS.					
Junior Two-year-old.		Yrs. dys.	lb.		lb.	lb.
Eileen Sylvia ..	F. V. Bryant, Ruawhata ..	1 360	240·5	365	11,371·5	565·34
Ivondale Gold Star ..	P. J. Petersen, Brixton ..	1 322	240·5	365	9,622·3	506·97
Hillview Chrystable ..	F. J. Saxby, Hamilton ..	2 65	247·0	365	9,562·1	483·70
Miss Petune Clematis	R. C. Leach, Woodville ..	2 0	240·5	365	8,615·3	474·08
Tirohia Briar Leaf ..	B. E. Veale, Tirohia ..	2 15	242·0	365	8,254·0	469·18
Wairua Flame ..	A. L. Dermer, Stanway ..	1 333	240·5	365	9,632·8	468·42
Koro Koro Dulcie ..	R. W. Southee, Kiwitea ..	2 18	242·3	365	7,692·3	467·27
Hua Brook Dulcet ..	H. Salway, Bell Block ..	1 353	240·5	365	8,049·3	445·47
Meadowvale Armistice	E. O'Sullivan and Sons, Tariki	1 338	240·5	365	7,122·3	440·84
Balla Mona Nora† ..	W. D. Dron, Spring Grove..	2 80	248·5	365	7,891·9	439·67
Brookvale Superior Lady	J. Kelso, Pukeroro ..	2 27	243·2	342	7,138·5	437·79
Mecca†	C. Stevens, Maungatapere ..	2 33	243·8	347	7,953·6	432·43
My Lady of the Cave	M. Devenish Meares, Te Puna	2 26	243·1	305	8,440·5	428·57
Koro Koro Dairymaid	R. W. Southee, Kiwitea ..	1 312	240·5	365	6,710·9	417·82
Ngahiwi Lady Patience	W. J. Freeth, Waitara ..	2 45	245·0	361	7,342·8	416·30
Melody's Harmony ..	J. Kelso, Pukeroro ..	2 1	240·6	345	6,218·3	415·57
Koro Koro Joy ..	R. W. Southee, Kiwitea ..	2 4	240·9	365	7,753·3	408·19
Koro Koro Gipsy ..	R. W. Southee, Kiwitea ..	2 56	246·1	365	7,026·2	396·13
Koro Koro Ruth ..	R. W. Southee, Kiwitea ..	2 5	241·0	365	6,370·1	394·07
Jerseydale Trinket ..	J. Pettigrew, Pihama ..	1 307	240·5	362	7,837·9	392·88
Oaklands Rosebud ..	W. H. Jakins, Christchurch	2 18	242·3	365	7,106·9	390·80
Woodstock Suzanne..	A. Banks and Son, Kiwitea	1 217	240·5	365	7,345·6	389·25
Corra Lynn Madam Swan	A. Best, Bombay ..	2 16	242·1	365	6,538·9	376·41
Twylish Eyes ..	C. Parker, Hairini ..	1 348	240·5	365	5,987·2	367·81
Springburn Gem ..	R. L. Horn, jun., Ohau ..	2 32	243·7	365	6,787·2	361·61
Woodstock Golden Lass	A. Banks and Son, Kiwitea	1 328	240·5	365	6,984·2	358·94
Middlewood Beatrice	Kilgour and Gibson, Kiwitea	2 19	242·4	365	6,344·5	356·15
Holly Oak Pearl ..	A. Hornig, Manakau ..	1 315	240·5	365	7,731·2	355·58
Silverdale Queen ..	G. Hodgson, Whakapara ..	2 81	248·6	349	6,017·7	338·59
Sabean of Bull's ..	F. J. Watson, Bull's ..	2 3	240·8	365	5,260·8	337·68
Molina's Chrystable ..	E. Hofmann, Katikati ..	2 62	246·7	352	5,856·3	320·28
Waimoeiti Sunset ..	A. Jellyman, Richmond ..	2 29	243·4	365	6,099·8	318·49
Hawkesbury Columbine	W. I. Fallows, Puni ..	1 350	240·5	365	6,400·7	317·11
Linwood Breeze ..	W. V. Hosking, Waiuku ..	1 349	240·5	300	5,965·7	300·87
Tinsel's Lady Claribelle	E. Hofmann, Katikati ..	2 38	244·3	296	6,183·3	290·23
Springdale Fidel ..	J. A. Blake, Waipawa ..	2 22	242·7	274	4,996·1	277·86
Springdale Sea Nymph	J. A. Blake, Waipawa ..	2 31	243·6	290	4,837·1	245·58
Senior Two-year-old.						
Majesty Mahone† ..	C. Stevens, Maungatapere..	2 127	253·2	365	10,336·9	591·38
Remarkable Mary ..	S. Dale, Fairlie	2 152	255·7	365	9,329·3	577·18
Silverdale Joan ..	G. Hodgson, Whakapara ..	2 362	276·7	355	8,534·5	504·34
Woodstock Nonette ..	A. Banks and Son, Kiwitea..	2 337	274·2	365	9,643·7	465·21
Belvedere Twylight ..	E. B. Eagle, Greytown ..	2 356	276·1	303	9,046·3	455·22
Ngahiwi Destiny ..	W. J. Freeth, Waitara ..	2 308	271·3	355	7,265·5	431·44
Hua Brook Golden Gift	H. Salway, Bell Block ..	2 189	259·4	358	6,654·4	428·43
Burnside Gem ..	S. J. Hollard, Rowan ..	2 363	276·8	314	5,890·5	363·59
Madrid†	C. Stevens, Maungatapere..	2 314	271·9	341	6,509·4	331·97
Three-year-old.						
Fancy Princess ..	H. Salway, Bell Block ..	3 332	310·2	365	8,836·4	548·59
Daphne's Glory ..	F. V. Bryant, Ruawhata ..	3 4	277·4	365	8,777·3	525·69

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
	JERSEYS—*continued.*					
Three-year-old—continued.		Yrs. dys.	lb.		lb.	lb.
Kairona's Miss Petune	R. C. Leach, Woodville ..	3 311	308·1	365	8,669·0	523·62
Woodstock Fantail ..	A. Banks and Son, Kiwitea	3 22	279·2	365	8,378·2	481·18
Maiden's Neatness ..	W. McKenzie, Palmerston N.	3 102	287·2	365	7,587·8	479·95
Hautere Rosette ..	C. Parker, Hairini ..	3 341	311·1	354	8,176·6	446·40
Noble Golden Fern† ..	C. Stevens, Maungatapere ..	3 57	282·7	348	8,058·6	411·32
Four-year-old.						
Lady's Perfection ..	A. E. Watkin, Takanini ..	4 118	325·3	365	16,449·1	770·20
Rosa's Ripple ..	S. R. Lancaster, Palmerston North	4 34	316·9	365	10,503·5	622·79
Media	C. Stevens, Maungatapere ..	4 20	315·5	351	10,095·5	568·92
Silverdale Stella ..	G. Hodgson, Whakapara ..	4 9	314·4	365	9,310·1	542·39
La Belle Vache ..	A. A. White, Auckland ..	4 103	323·8	363	9,801·5	483·82
Maxim's Maid Browne†	C. Stevens, Maungatapere ..	4 312	344·7	365	7,594·4	482·77
Collingwood's Angel ..	Estate of E. Hellyer, Dunedin	4 232	336·7	295	7,652·3	464·33
Gay's All Brown ..	B. E. Veale, Tirohia ..	4 338	347·3	365	7,946·2	440·77
Helen of Rodney ..	C. Parker, Hairini ..	4 349	348·4	359	6,803·3	414·58
Royal Patritia† ..	C. Stevens, Maungatapere ..	4 117	325·2	342	4,850·3	357·44
Mature.						
Mystery's Golden Girl	A. E. Watkin, Takanini ..	5 77	350·0	365	13,027·4	753·73
Lady Ivy	John Hale, New Plymouth	8 46	350·0	365	11,444·7	736·66
Dulcie's Belle ..	W. S. Knuckey, Waitara ..	5 290	350·0	365	12,650·2	720·94
Kuku's Lightfoot ..	R. L. Horn, sen., Ohau ..	8 11	350·0	365	12,415·4	659·72
Norfolk Park's Sea Queen	H. Salway, Bell Block ..	5 18	350·0	365	10,479·5	628·92
Ponga's Girl ..	R. C. Leach, Woodville ..	8 330	350·0	365	10,809·6	622·85
Basra†	C. Stevens, Maungatapere ..	6 220	350·0	361	11,174·1	596·10
Maxim's Maid Cherry†	C. Stevens, Maungatapere ..	7 54	350·0	347	9,740·4	592·46
Treasure Trove ..	W. J. Freeth, Waitara ..	5 356	350·0	362	11,336·5	571·26
Oakvale's Fussey ..	I. McEldowney, New Plymouth	5 5	350·0	365	10,297·6	568·57
Viola's Daisy Girl ..	W. H. Fitness, Rehia ..	5 24	350·0	365	9,259·9	551·18
Molly Mahone† ..	C. Stevens, Maungatapere ..	10 93	350·0	328	9,586·9	532·91
Golden Fernleaf† ..	C. Stevens, Maungatapere ..	9 15	350·0	321	9,452·9	522·13
Eileen's Treasure ..	H. Salway, Bell Block ..	5 12	350·0	332	9,257·6	515·96
Imogene†	C. Stevens, Maungatapere ..	6 190	350·0	365	7,994·4	510·27
Beechland's Joy ..	A. Moreland and Son, Te Rapa	7 205	350·0	365	11,260·1	508·90
Lucky Find ..	W. S. Knuckey, Waitara ..	6 50	350·0	314	8,489·9	505·91
Golden Wonder† ..	C. Stevens, Maungatapere ..	7 103	350·0	323	10,444·4	498·91
Maxim's Maid Ruby†	C. Stevens, Maungatapere ..	7 27	350·0	305	10,782·5	478·50
Nirvana	A. Moreland and Son, Te Rapa	11 142	350·0	365	9,477·0	475·36
Fascination ..	R. C. Leach, Woodville ..	10 286	350·0	347	9,073·8	468·03
Lady Joffre ..	E. L. Roose, Pukekohe ..	9 12	350·0	365	9,773·7	466·75
Cecile†	C. Stevens, Maungatapere ..	7 41	350·0	357	7,740·8	447·44
Cosmos†	C. Stevens, Maungatapere ..	6 298	350·0	320	8,945·9	447·02
Genee†	C. Stevens, Maungatapere ..	7 34	350·0	359	6,995·9	443·18
Charming Irene† ..	C. Stevens, Maungatapere ..	8 349	350·0	307	8,563·8	431·16
Silverdale Lilac ..	G. Hodgson, Whakapara ..	5 118	350·0	308	8,231·8	414·42
Murie†	C. Stevens, Maungatapere ..	7 57	350·0	365	8,475·4	403·87
Mistral†	C. Stevens, Maungatapere ..	8 345	350·0	365	8,535·3	403·13
Damsel Fox ..	C. Parker, Hairini ..	6 6	350·0	336	7,454·6	399·03
Golden Vision ..	A. A. White, Auckland ..	9 35	350·0	287	7,512·0	381·06
Rewa Maytime ..	J. A. Blake, Waipawa ..	8 203	350·0	332	7,233·2	379·03

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
		FRIESIANS.				
Junior Two-year-old.		Yrs. dys.	lb.		lb.	lb.
Matangi Manola* ..	Matangi Friesian Farm Co., Matangi	1 348	240·5	365	13,904·5	448·27
Fencourt Arcadia† ..	J. H. Jamieson, Cambridge	2 25	243·0	365	12,142·6	400·71
Miss Rose de Kol† ..	R. H. Hammond, Ohakune	2 108	251·3	350	12,657·8	396·81
Longbeach Daisy 4th*	J. H. Grigg, Longbeach ..	2 82	248·7	365	11,845·6	396·06
Marire Zuyder Girl ..	F. O. Stack, Kiwitea ..	1 274	240·5	365	9,151·2	392·07
Segis Colantha Abbekerk†	H. W. Hoskin, Mangatoki	1 359	240·5	355	11,254·0	368·34
Jessica Posch of Oakview	H. T. Cook, Appleby ..	1 311	240·5	333	9,680·5	366·52
Colantha Segis Pauline†	H. W. Hoskin, Mangatoki..	2 31	243·6	331	11,016·2	356·64
Colantha Abbekerk de Kol†	H. W. Hoskin, Mangatoki..	2 42	244·7	336	10,671·7	351·98
Mahoe Ixia Pontiac*	R. A. Wilson, Turakina ..	1 333	240·5	365	8,456·3	299·71
Senior Two-year-old.						
Queen Mercena Posch†	N. P. Nielsen and Son, Tiakitahuna	2 248	265·3	365	13,302·7	471·69
Oaklea Mercena Lassie*	R. A. Wilson, Turakina ..	2 338	274·3	365	9,239·8	439·73
Longbeach Netherland Princess*	J. H. Grigg, Longbeach ..	2 284	268·9	365	12,370·6	410·93
Marire	F. O. Stack, Kiwitea ..	2 298	270·3	337	8,931·4	395·24
Marire Twylight ..	F. O. Stack, Kiwitea ..	2 339	274·4	365	10,633·3	384·55
May Mischief Alcartra†	S. Andrew, Kaikoura ..	2 363	276·7	327	10,157·1	370·18
Roslyn Netherland Pride*	R. A. Wilson, Turakina ..	2 281	268·6	274	11,084·9	361·46
Dominion Mercedes Pride	Central Development Farm, Weraroa	2 264	266·9	349	11,163·7	329·93
Junior Three-year-old.						
Oaklea Julip Pietertje†	N. P. Nielsen, Tiakitahuna	3 36	280·6	300	15,031·9	470·60
Oaklea Creamelle* ..	R. A. Wilson, Turakina ..	3 136	290·6	321	12,936·5	415·54
Ashlynn 66th ..	R. A. Wilson, Turakina ..	3 9	277·9	279	9,499·7	387·78
White Rose Alcartra†	S. Andrew, Kaikoura ..	3 70	284·0	341	11,756·7	363·49
Bloomfield June de Kol†	Bloomfield Farm Co., Wellington	3 153	292·3	300	9,164·8	341·29
Springbrook Belle Westport†	John Court, Ltd., Auckland	3 363	313·3	365	19,583·5	627·00
Junior Four-year-old.						
Tinie Korndyke* ..	John Court, Ltd., Auckland	4 0	313·5	365	22,521·1	679·99
Mary Alcartra† ..	S. Andrew, Kaikoura ..	4 86	322·1	338	13,003·9	474·02
Ashlynn 49* ..	R. A. Wilson, Turakina ..	4 70	320·5	330	10,788·3	384·93
Fencourt Pet† ..	J. H. Jamieson, Cambridge..	4 68	320·3	322	11,851·1	344·81
Senior Four-year-old.						
Hinemoa Beauty* ..	T. R. Eades, Edendale ..	4 347	348·2	365	23,973·0	822·37
Lady Astor Alcartra†	S. Andrew, Kaikoura ..	4 192	332·7	360	13,817·3	386·46
Mature.						
Lady Zozo Alcartra Van Racelands*	C. W. Baldwin and Sons, Ngatoro	5 359	350·0	365	23,158·6	832·59
Pietje Manola* ..	Matangi Friesian Farm Co., Matangi	7 349	350·0	365	18,964·0	657·16
Lady Josina Segis† ..	C. R. Duncan and Sons, Whangamarino	7 241	350·0	365	16,146·3	598·14

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season		
				Days.	Milk.	Fat.
			FRIESIANS —*continued.*			
Mature—continued.		Yrs. dys.	lb.		lb.	lb.
Tirania of Carlowrie†	R. K. Macdonald, Edendale	7 348	350·0	365	18,927·5	587·01
Manola Princess* ..	Matangi Friesian Farm Co., Matangi	6 352	350·0	365	16,422·2	578·73
Parthena Alcartra Rose†	H. W. Hoskin, Mangatoki..	8 43	350·0	365	16,994·0	545·27
Galatea Segis 3rd† ..	H. W. Hoskin, Mangatoki..	7 57	350·0	365	16,222·2	528·84
Woodlyn Lylac de Kol†	T. C. Barbour, East Tamaki	5 62	350·0	327	14,063·3	517·94
Ashlea Mascot Colantha*	R. A. Wilson, Turakina ..	6 343	350·0	364	12,939·8	495·31
Grebegga Pauline of Kulnine*	S. Andrew, Kaikoura ..	7 66	350·0	332	13,883·5	484·25
Segis 2nd Rose† ..	H. W. Hoskin, Mangatoki..	7 53	350·0	365	15,042·5	481·70
Princess View† ..	G. A. Marchant and Sons, Cardiff	9 47	350·0	182	12,506·2	459·75
Longbeach Big Dutch Queen*	Muff Bros., Orari.. ..	6 288	350·0	299	12,674·2	444·16
Kittie Maid of Maplehurst*	R. A. Wilson, Turakina ..	5 66	350·0	275	13,675·9	440·86
Dutchmain 4th† ..	N. P. Nielsen, Tiakitahuna	8 87	350·0	303	12,942·8	409·04
Fairmont Grace Pietertje*	James Hart, Tatuanui ..	5 88	350·0	214	11,199·3	399·47
			MILKING SHORTHORNS.			
Junior Two-year-old.						
Glenthorpe Daisy 2nd†	A. J. Melville, Buckland ..	1 349	240·5	365	10,123·3	432·09
Pine Farm Jewel 4th A	J. Parkinson, Opotiki ..	1 268	240·5	365	10,189·9	406·76
Matangi Riri† ..	Ranstead Bros., Matangi ..	2 8	241·3	365	9,380·5	345·99
Brookside Beckey ..	J. Pease, Matatoki ..	2 76	248·1	326	7,445·5	305·79
Berkenlee Eclipse ..	J. W. Robinson, Runciman	2 2	240·7	338	6,688·1	275·79
Willowbank Lady ..	J. W. Robinson, Runciman	2 152	255·7	302	6,404·7	260·19
Senior Three-year-old.						
Matangi Sunshine 2nd†	Ranstead Bros., Matangi ..	3 361	313·1	365	12,386·5	524·44
Senior Four-year-old.						
Matangi Ruth 2nd† ..	Ranstead Bros., Matangi ..	4 355	349·0	340	11,670·3	644·90
Mature.						
Glenthorpe Lady* ..	A. J. Melville, Buckland ..	..	350·0	365	20,136·2	856·85
Glenthorpe Daisy* ..	A. J. Melville, Buckland ..	..	350·0	324	14,025·2	694·10
Riverdale Dolly 1st†	T. W. Wardlaw, Waimana..	..	350·0	365	16,902·7	623·48
			AYRSHIRES.			
Four-year-old.						
Betty 4th of Waipapa	Fred. Mills, Waipapa ..	4 337	347·2	335	9,815·2	383·72
Mature.						
Ivanhoe Fancy* ..	A. M. Weir, Menzies Ferry..	6 25	350·0	352	11,432·8	547·88
Meg of Haydowns ..	Fred. Mills, Waipapa ..	..	350·0	353	12,137·0	472·57

Second-class Certificates.

			JERSEYS.			
Junior Two-year-old.						
Collingwood Iris ..	G. Murray, Lake Tekapo ..	2 27	243·2	365	5,276·3	340·17

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
		Yrs. dys.	lb.		lb.	lb.
Second-class Certificates—continued.						
JERSEYS—*continued.*						
Senior Two-year-old.						
Palmdale Golden Dawn	D. Kennedy, Morven ..	2 359	276·4	365	9,775·0	559·05
Holly Oak's Lady General	John Hale, New Plymouth	2 191	259·6	365	9,101·7	531·74
Three-year-old.						
Folly's Pet ..	G. A. Gamman, Marton ..	3 273	304·3	365	9,419·7	532·20
Tower View Princess	O. Ross, Waihi	3 344	311·4	365	5,949·7	372·66
Rainsbrook Veronica	W. C Raymond, Pleasant Point	3 351	312·1	318	5,711·7	325·00
Four-year-old.						
Nellie	James Naughton, Matapu ..	4 376	341·1	365	10,470·9	564·91
Mature.						
Lady Superior ..	John Hale, New Plymouth..	6 168	350·0	365	15,985·2	997·30
Rewa Ambrosia ..	W. H. Hall, Carterton ..	7 246	350·0	365	12,001·3	482·04
Oakden Rosebud ..	W. H. Jakins, Christchurch	7 316	350·0	283	8,373·3	423·43
FRIESIANS.						
Senior Four-year-old.						
Rosevale Burkeyje Flora*	H. North and Sons, Omimi	4 287	342·2	365	21,270·4	793·15
Mature.						
Millbrook Pietje Netherland*	Matangi Friesian Farm Co., Matangi	11 322	350·0	365	19,309·8	725·91
Friesland Park Alba Colantha*	Muff Bros., Orari.. ..	9 233	350·0	365	16,191·5	541·46
Pauline de Kol Fayne*	R. A. Wilson, Turakina ..	5 9	350·0	365	13,096·2	447·77

CATTLE-TICK INVESTIGATION BULLETIN.

A BULLETIN entitled "The Cattle-tick (*Haemaphysalis bispinosa*): Investigations during 1923–24" (No. 116) has been issued by the Department. The author is Mr. J. G. Myers, of the Biological Laboratory Staff, Wellington (at present in America), who contributed to the *Journal* of May, 1924, a summary of this his main report on the subject. The bulletin is of 105 pages, royal octavo size, with seventeen illustrations, and a limited edition only has been printed. For this reason it can be supplied only to special applicants.

Rabbit-control in Manawatu.—Regulations under the Rabbit Nuisance Amendment Act, 1920, were gazetted on 23rd January, the effect of which is to suspend trapping in the Manawatu Rabbit District except by permission and under conditions specified by the Board.

Wet-weather Work.—When rain prevents outside work at this season, time may profitably be devoted to the cleaning and oiling of the haymaking and harvesting machinery.

CARBON BISULPHIDE FOR RABBIT-FUMIGATION.

Live-stock Division

WHERE rabbits are living in burrows on fairly open country, fumigation of the burrows with carbon bisulphide is easily the most effective method of destroying them. Following are directions for the use of this material, and other relevant hints :—

Procure a deep tin or billy, about 6 in. in diameter—one fitted with a lid for preference. Cut pieces of old sacking of a size to fit into the tin selected, and, after filling the tin with these, pour in sufficient carbon bisulphide to cover them well. If any considerable time is likely to elapse after the carbon bisulphide is poured into the tin containing the pieces of sacking, the tin should either be covered with a tight lid, or sufficient water added to cover the carbon bisulphide ; the water will float on the latter and prevent evaporation.

Be careful to locate every exit from the burrow to be fumigated, and, when this is done, dig each back sufficiently to provide a solid face. Push a piece of the sacking saturated with carbon bisulphide *well into each burrow* with a rod or piece of wire, then fill the openings with plenty of earth, and *tread or ram tightly*. If it is desired to ignite the gas, proceed as just stated, excepting that one opening should be only lightly covered so that it may be easily reopened. *Allow about four minutes* for the gas to permeate the burrows after the saturated sacking has been added and the openings closed, then reopen the one which has been lightly covered, and, after placing a fresh piece of saturated sacking, ignite the gas with a torch or match. (Caution : The operator should stand well to one side when igniting the gas.) If any of the openings should be uncovered by the explosion they should be reclosed as directed above. It is a decided advantage to ignite the gas when dealing with very large burrows, as a much greater volume is thereby produced, and the explosion which results forces the gases to the farthest recesses of the burrows ; it will also show any openings that may have been missed.

In order to get the maximum results, all the country in the vicinity of the burrows which it is intended to fumigate should be thoroughly hunted with dogs to drive rabbits that may be lying out into the burrows before fumigating.

Excepting in land of very open texture, such as sandy formation, fumigation can be effectively carried out at any time ; but the best results are obtained during fairly calm weather and when the earth is moist. The most favourable time is during showery weather or after rain. Burrows in land of open texture, such as pumiceous or sandy formation, should be fumigated during showery weather or immediately after a fall of rain.

Carbon bisulphide evaporates very quickly when exposed to the atmosphere. In order to guard against this, after opening a container of the material, pour enough water on top to completely cover it. If a cork is used it should be sealed with glue, mucilage, or glycerine. If water is added to prevent evaporation, care must be taken to ensure that it is *all poured off* immediately before the carbon bisulphide is again used, as otherwise the sacking may be saturated with water in place of carbon bisulphide.

Carbon bisulphide should be carefully kept away from fire.

SEASONAL NOTES.

THE FARM.

AUTUMN SOWING OF PASTURES.

MARCH is one of the best months for sowing pastures, both temporary and permanent, on the lower-lying country. With altitudes over 1,000 ft. better results are generally obtained by late spring sowing. The main point is to sow at a time when clovers will get well established before severe frost sets in. There is a great diversity of opinion, especially in regard to permanent pasture, as to whether some cereal should be sown with the grass-seed to afford shelter. In the majority of cases the grass is best sown by itself, as the cereal is a keen competitor and generally causes the grass stand to be weaker than if sown alone. There are, however, certain exceptions. Thus, in very exposed situations a bushel of oats or barley per acre may be used for shelter advantageously, and again if the sowing is late (say, at the end of April or in May); but in no case should more than 1 bushel be sown with a permanent-grass mixture.

In deciding on a grass-mixture great care is necessary to ensure that grasses suitable to the land and locality are selected, and that a proper balance between grasses and clovers is maintained. For first-class free lands the following permanent mixture is a good basis to work on: Cocksfoot, 12 lb.; perennial rye-grass, 16 lb.; Italian rye-grass, 4 lb.; timothy, 4 lb.; crested dogstail, 2 lb.; red clover, 3 lb.; white clover, 2 lb.: total, 43 lb. per acre. Where the land is stiffer and wetter the following is suggested: Cocksfoot, 6 lb.; perennial rye-grass, 20 lb.; timothy, 4 lb.; meadow-fescue, 4 lb.; meadow-foxtail, 2 lb.; alsike, 2 lb.; red clover, 2 lb.; white clover, 2 lb.: total, 42 lb. per acre. Under North Island conditions, if the land lies warm, 10 lb. of prairie-grass may be added with advantage to the former mixture.

Temporary pastures consist of (1) a truly temporary pasture to last one year only, and (2) a temporary dairying pasture that with care may be carried on from two to four years. For the former a sowing of 25 lb. Italian or Western Wolths rye-grass and 5 lb. red clover per acre is suitable; and for the latter 16 lb. perennial rye-grass, 12 lb. Italian rye-grass, 4 lb. red clover, and 2 lb. white clover is recommended; while for land of a free and warm nature in the North Island 10 lb. of prairie-grass could again be added. If the last-mentioned mixture is judiciously top-dressed it should remain good for three or four years

In preparing the land for pasture, care must be taken to provide a fine, firm tilth. If the soil is not well consolidated a great deal of the seed is buried too deeply and fails to germinate. The ideal condition is to get the seed buried about $\frac{1}{2}$ in. deep. If the seed-bed has been well consolidated, light tine harrows give good results, otherwise chain or brush harrows are the best. The question of rolling after sowing at this time of the year must be left to the farmer's judgment. No hard-and-fast rule can be laid down. If the land is dry and the weather inclined to be fine, rolling should be done. If, on the other hand, the land is at all wet and rain frequent it is better not to roll.

Suitable manures for applying with pastures are basic super or basic slag, 2 cwt. per acre, or mixtures of 2 cwt. super and 2 cwt. carbonate of lime. If it is considered that the land is weak in plant-food and heavier dressings are desirable the extra dressing is better applied in the early spring.

WINTER AND EARLY SPRING FORAGE CROPS.

The sowing of these crops should now be pushed along. If the crop is to be grazed during winter and early spring, and the land then turned over, Algerian oats at the rate of 3 to 4 bushels per acre are probably the best for general purposes, or a mixture of 2 bushels Algerian oats and 1 bushel Western Wolths rye-grass. Black Skinless barley at 2½ bushels per acre also gives good results, and if feed is desired quickly it is the best, as it is usually ready to feed two or three weeks before any other cereal. When the land is inclined to be sour a mixture of Algerian oats and rye-corn, half and half, 3 to 4 bushels per acre, is recommended. If the crop is to be fed during winter and carried on for hay or ensilage, a mixture of 2½ bushels Algerian oats and 1 bushel grey tares is advised, as this mixture makes better ensilage than oats alone. Sometimes tares are sown with oats where it is intended to prepare the land for another crop in the spring. In such case it is doubtful if sufficient fodder is obtained from the tares to warrant their inclusion. Unless the land is very rich this type of crop should be liberally manured; super or basic super, at 2 cwt. per acre, is a suitable fertilizer.

HARVESTING CLOVER-SEED.

A feature this season in some districts, such as Marlborough, was the late appearance of the humble-bees. For farmers whose growth of clover, after the November or December hay-cut, was late coming into head this would, if anything, be an advantage, while in the case of stands which have headed early many of the heads will mature without setting seed and so become dummies. Where the majority of the clover-heads fall into this category it goes without saying that the farmer will be well advised to make a hay-cut instead of allowing the crop to remain for seed. When the clover-seed may be rubbed out from the majority of the heads, and when the stalks begin to lie over at an angle of 45°, it is time to cut. The best method of harvesting is probably to use steel bands which trail behind the mower. These are especially valuable when white clover is being cut. When this method is employed the driver of the mower uses an improvised seat—half a sack of chaff being a handy method. The mower-seat should be turned back to front. A second man sits on this and guides the clover out into heaps which lie clear of the wheel in the course of the next cut. By this system the clover may be left in windrows without any trouble. The bands work best with very dry material. Another method of clover-seed harvesting commonly employed and generally attended with successful results is that involving the use of the side deliverer.

If the material is exceedingly dry it may often be threshed immediately after stacking, before the stack begins to sweat. However, it is frequently the case when the clover is stacked that many

of the heads are somewhat immature, hence a certain amount of curing in the stack is essential. Once the stack goes into the sweat it should be left for at least a month before threshing is attempted. After threshing is completed the straw-stack should be built with a steep pitch to turn the rain.

LUCERNE.

Young spring-sown crops should be ready for a second cutting during March, and as the weather is then usually dry it is a good time to give them a light cultivation. The tine harrows are, as a rule, heavy enough for this operation. The object is to destroy any grass or permanent weeds that are getting established, and leave the surface of the land in free condition for the winter. Young stands of lucerne should not be grazed in the first season.

Old stands that are getting thin can have their usefulness considerably extended by sowing Italian rye-grass on them after the autumn cultivation. The rye-grass fills up bare ground and provides a heavy crop in the spring. In some districts the practice of sowing 2 bushels of Algerian oats on lucerne stands in March and April has become fairly common, the object being to fill up all bare ground, crowd out weeds during the winter months, and provide a heavy spring crop for green feed or ensilage. So far observations indicate that where the oat crop is cut fairly early no harm is done, but where the oats are allowed to get well out in ear there are indications that the subsequent growth of lucerne is slightly stunted. However, there is not yet sufficient evidence to warrant definite conclusions regarding the relative benefit or otherwise of this practice to the lucerne stand.

PASTURE-MANAGEMENT AND SURPLUS FEED.

Owing to the favourable season there is now on many farms a surplus of feed that can be usefully disposed of. Pastures that have "got away" should, if possible, be mown, more especially in northern districts where the dominant grass is paspalum. This allows the young undergrowth to make a start, and freshens up the feed. If the paddocks are taken in rotation at intervals there will be no shortage, even for a few days, and the benefit derived from the clearing-away of the rank unpalatable top growth is soon noticeable On some farms this surplus grass can be raked together and made into hay or ensilage, so that a double benefit is obtained. In any case the mown grass, if there is any quantity and it is not eaten on the ground by stock, should be removed from the surface of the paddock, and the tripod harrows set to work. This harrowing spreads the stock-droppings and breaks the hard surface of the ground, thus permitting the entrance of any rain that falls.

Surplus crops of maize and Japanese millet should be converted into ensilage. The stack method is quite suitable for this purpose, more especially if there is over, say, 25 tons of material. With less material than this the proportion of waste is apt to be high, but even this is better than allowing crops to become frosted and a total loss.

—*Fields Division.*

THE ORCHARD.

MARKETING OPERATIONS.

DURING the next two months the harvesting of all mid-season varieties of apples and pears will engage the attention of growers. This usually means a very busy time in picking, grading, and packing. It is to be hoped that every endeavour will be made by those exporting to do all in their power to comply with the regulations, and pack only such fruit as will bring credit upon the fruit in overseas markets.

With reference to fruit intended for the local markets, growers will be well advised when packing not to include anything that is visibly codlin-mothed, and to guard against any stray infested fruits getting in. Every endeavour should be made to eliminate this pest altogether: if instructions have been carried out codlin-moth should be conspicuous by its absence. Blemishes caused by branch rubs or slight infection of black-spot, when weather conditions have been such as to make spraying at the correct time a difficult matter, sometimes escape the vigilance of packers, but the inclusion of such fruits should be avoided as much as possible.

Fruit intended for cool-storage purposes should be allowed to reach that stage of maturity when it will keep best. That period can best be judged from past experience. It is quite obvious that the fruit should not be fully ripe but yet fully mature. This period varies with different varieties in different localities.

SPRAYING.

It will still be necessary to continue spraying late varieties of apples and pears with arsenate of lead for codlin-moth and leaf-roller caterpillar. If red spider is in evidence lime-sulphur should be added, although very little good will result if the measures previously recommended for controlling this pest have not been put into practice. This insect does most of its damage to foliage during December, January, and February, and then deposits its eggs in every sheltered portion of tree—buds and the under-sides of branches—in readiness for the following season.

Woolly aphis should be kept in check by spraying the trees with Black Leaf 40, 1–800; or, where fruit has been gathered, red oil, 1–60, can be used. Spraying for this pest does not consist in merely wetting the trees. It is necessary to use a high-pressure pump in making the application, so as to remove the covering protecting the insects, thus enabling the fluid to make direct contact with their bodies, otherwise spraying is of very little value.

—L. Paynter, Orchard Instructor, Christchurch.

CITRUS-CULTURE.

Where necessary a further application of fungicidal spray—bordeaux, 4–4–40—should be applied to all citrus-trees during the coming month. Other work will include the maintenance of thorough cultivation and the harvesting of any remaining fruit.

FIREBLIGHT.

There is yet time this season for further infection from fireblight to occur in the form of tip-infection, and strict watch must be kept

in order to identify the same immediately upon appearance. In case of infection, treatment should be carried out as outlined previously in these notes.

—*J. W. Collard, Orchard Instructor, Auckland.*

POULTRY-KEEPING.

CULLING.

THE coming month is an excellent period for culling the second-year hens. Any of these showing signs of moulting should be disposed of at once, for as a general rule it indicates that their profitable laying-period has passed; moreover, the early moulter is always undesirable for the breeding-pen. The marketing of birds should not be delayed until the moult has practically set in. They should be disposed of immediately they commence to take their rest prior to going into a moult, as from a poulterer's point of view the bird in heavy moult is difficult to dress and does not present an attractive appearance.

In addition to weeding out all two-year-old birds that show signs of having passed their best period of production, the first-season layers should also be gone through and the weak ones discarded. As a general rule the latter will commence to moult before the former. Thus when one-year-old and two-year-old birds are running together, and there is no mark for age-determination, the time of moulting will not give a good guide in the work of culling. In such cases the only safe course is to discard all birds showing a weak constitution. No sentiment should be allowed to enter into this matter, as in practically all flocks birds are found that will not pay beyond their first laying season. Especially is it necessary to keep only high-class laying stock in these times of exceptionally high cost of foodstuffs.

Birds it is intended to cull at the termination of the present laying season, and which are now in a laying condition, should be forced for egg-production by including a good supply of meat, milk, &c., in the ration, so as to secure every possible egg from them before being marketed. Even if an odd bird shows the effects of the forcing condition by ovarian troubles, &c., it will pay to destroy it rather than retard the laying of the others by providing a less forcing ration.

Returning to the question of culling out the early moulter, it is sometimes claimed that the bird which moults first must necessarily be the first to recover from it, and will naturally be in a producing condition when the feathers of the late moulter are being renewed, thereby showing as good a profit for the year as the latter. This may be true in isolated cases, but in a general way it is not so. It stands to reason that for a bird to be a heavy egg-producer she must necessarily be a long-season layer, and obviously to be a long-season layer she must be a late moulter, for it is rarely that fowls moult and continue laying at the same time. It will generally be found that the high-type layer (the late moulter) will lay for several weeks longer in the autumn (when the price of eggs is on the up-grade) than the early moulter, and then, after renewing its feathers, will resume laying before the bird that moulted first. Of course, no rule

is capable of universal application, and, not unlike all other things connected with poultry-keeping, local conditions must always be taken into account.

PROSPECTIVE BREEDING-HENS.

The next breeding season is certainly far off, but nevertheless no time should be lost in selecting the best hens for future breeding operations. If the best specimens are to be secured the selection must be carried out before the general moult sets in. At this time certain signs manifest themselves indicating laying-capacity and constitutional vigour. These signs generally vanish as the moult sets in, and are not easily observed again until towards the termination of the following laying season. The signs include late moulting, tight feathering, bright prominent eyes, clean face (often the head being devoid of feathers), deep abdominal development, with fine texture of skin, well-developed crop, and an active businesslike appearance. These points should be combined with breed characteristics, and, above all, the birds should conform to the standard weights of the breed they represent.

As the birds are selected they should be carefully marked and placed by themselves, preferably on a free range. They should not be forced for egg-production. Such birds should receive a plain ration and be kept in a healthy but not overfat condition, and otherwise given every opportunity to recuperate after their exhaustive laying season. It must be remembered that they have the moult to go through, which is in itself a considerable drain on the body. This must be made good before the laying season, as if the birds are to leave highly desirable progeny they must have the necessary vitality inseparable from good health when called upon to produce eggs for reproductive purposes.

When considering the birds that are to be kept for future breeding purposes it is a good plan to have trap-nests, so that birds which lay small eggs may be discarded and their places taken by better stock. The matter of small eggs is becoming a serious one, especially in view of the fact that they cannot be exported to the same advantage as, say, the 2 oz. product. There is no better way of raising the standard weight of eggs than by eliminating from the breeding-pen birds which lay eggs of an undesirable size.

DEAR EGGS.

During next month the majority of the adult hens will be preparing for or passing through the moulting process. It is therefore a time when the pullets must be depended upon for the main egg-yield. Obviously the pullets should be provided with every favouring condition if a maximum of dear-season eggs is to be produced. Of course, they should now be settled down in their permanent winter quarters, and the management they receive should be as uniform as possible. Changing the birds from house to house just when they have commenced to lay, or are on the point of laying, is apt to bring on a premature moult and a loss of winter eggs. Any sudden change of diet is also apt to have this undesirable effect; any change should be made as gradually as possible.

If the birds are to lay to their maximum capacity some forcing-food, such as boiled meat, meat-meal, &c., should be included in the ration. Beware of poor-quality foodstuffs, especially where the laying pullet is concerned. Some of the samples of ground food upon which my opinion has recently been asked would be dear at half or even a quarter of the price charged for them—especially some of the so-called oaten pollards. These chiefly consisted of ground husks, which are of no food value and next to useless for promoting egg-production. The cost of good-quality foodstuffs is certainly high at the present time, but nevertheless it is a penny-wise-and-pound-foolish policy to purchase damaged or inferior lines because they are cheap. A much better way to economize is to cull out the poor layers and give the remaining stock the best-quality food that is obtainable. Poultry-keepers who have a supply of last season's wheat should reserve this as far as possible for the pullets, as a sudden change from old to new wheat will probably bring on a premature moult.

Above all things should be remembered the important influence of prevailing weather conditions on the pullet bred to lay in winter. In last month's *Journal* some advice was given regarding the common causes of pullets catching colds, but it is well to emphasize the necessity of their not being subjected to extremes of weather. Again, in order to obtain eggs in the cold dear season the pullet should be given every opportunity to take exercise in comfort when unfavourable climatic conditions prevail. For this purpose the floor of the house should be well covered with litter, in which the birds are compelled to scratch for their grain ration. Among other things they require is plenty of succulent green food, gravel grit, crushed sea-shell, and clean water.

—F. C. Brown, Chief Poultry Instructor.

THE APIARY.

FINAL EXTRACTING.

FEBRUARY will probably see the end of the main honey-flow in most districts, and beekeepers will be wise to remove the last of the honey before the cold nights arrive. Once the honey in the hives has been allowed to become thoroughly chilled there is little prospect of its becoming warmed again when uncertain weather sets in. Wherever inclined to be thick the honey will be found exceedingly difficult to extract unless it is warm, and the beekeeper who delays too long will find that he will have to return to the hives combs almost as heavy as when they were removed. Thin honey extracts best when it is warm, but it is imperative that thick honey be not allowed to cool before extracting.

One of the principal matters to be attended to when the last of the honey is being removed is the condition of the brood-chamber. Many prolific queens keep the brood-chamber so full of brood throughout the season that the bees have very little room to store honey in it. Consequently, if all the honey in the supers is removed, such colonies stand a chance of being starved out before the end of the

winter. These colonies should not be reduced to less than two stories, and on no account should their stores be less than 30 lb. to 40 lb. It must be borne in mind that all the brood in the hive will hatch and must be fed, and that in addition the queen will continue laying for some months to come, while in some districts breeding may continue throughout the winter. To ensure the colony coming out strong in the spring it must be left with ample stores to carry it through the months of dearth. Unless there is ample evidence of an abundant autumn flow the beekeeper would be wise to leave his hives over-supplied rather than undersupplied.

USE OF BEE-ESCAPES.

For the comb-honey producer the Porter bee-escape is an invaluable aid in the removal of his crop. Removal of comb-honey by the ordinary method of brushing, &c., is apt to result in the piercing of many cell-cappings, with consequent leakage; but by the use of this simple little appliance, fitted in a board the size of a super, comb-honey can be removed without any disturbance of the colony. The super or supers should be prised up from the brood-chamber, two or three puffs of smoke driven into the hive, and the board gently slipped into place with the round hole of the escape uppermost. If this is done in the afternoon, by morning the super will be empty of bees.

For extracted honey the use of the escape is a more doubtful matter. In the first place, it is of absolutely no avail where there is brood in the super. The bees will not leave the brood, and the morning will find the combs still covered with bees. It might almost be said that the bee-escape is of no use for extracting combs unless the hives have been previously provided with excluders. In addition, especially in Southern districts, the use of the escape-board tends to allow the honey to cool considerably before morning, thereby making the work of extracting a much more difficult proposition. If there is a tendency to rob, the use of the bee-escape will materially assist in removing the honey late in the season, and whether their use is invariably advocated or not it is as well to have a few on hand.

PREVENTION OF ROBBING.

The taking of the last of the honey is the time when the beekeeper must display endless caution to prevent robbing. A bad attack of autumn robbing is—next to disease—about the worst thing a bee-keeper can experience. Before starting the day's work he should have all appliances handy, have formed a plan of how the work is to be carried out, and should, if satisfactory, adhere to that plan throughout the day. A light barrow fitted with a tray to catch honey-drips, and two or three cloths of a size to cover the whole of a super, and moistened with a very weak solution of carbolic acid, are some of the things which will obviate much trouble. As the combs are removed from the supers they should be brushed and shaken as free of bees as possible, placed in an empty super on the barrow, and covered with a damp cloth. Close every hive as soon as it is finished with, and remove the combs to the honey-house, which should be bee-proof. At the close of the day the wet combs should be returned to the hives as expeditiously as possible, and by morning the apiary will

be found to be in its normal condition. No pieces of wax, spilt honey, or anything likely to attract the attention of the bees should be left uncovered.

If the bees show a tendency to pounce on any particular hive the entrance should be contracted considerably and wet grass piled in front of the hive. If working in one portion of the apiary should cause robber bees to become too attentive it is advisable to shift the scene of operations to another part. It must be borne in mind that autumn robbing once commenced is hard to check, also that it is usually brought about by careless manipulation of the hives.

WEAK COLONIES.

As far as possible weak hives should not be tolerated during the winter months. During the warm days these stocks rarely escape the attention of robber bees, and are easily molested. Once they are attacked it is exceedingly hard to save them, and despite the efforts of the beekeeper they eventually get robbed out. It is usually the presence of weak hives in the apiary that starts autumn and winter robbing, and it is by far the best plan to unite them with stronger colonies in the apiary and avoid the risk of creating a disturbance among the bees when normal winter conditions should prevail. If weak colonies are not detected until late in the season a good plan to follow when uniting them is to put the weak hive on top of a strong one, placing a piece of newspaper between the two hive-bodies. In the course of a few days the bees in the weaker hive will eat their way through the paper and unite peaceably with the bees in the stronger hive. The surplus combs may subsequently be removed, and the hive made snug for wintering. If weather conditions permit, it is advantageous to destroy the queen in the weaker hive prior to uniting.

PREPARATIONS FOR WINTER.

As soon as the last of the honey is removed the beekeeper should see that the colonies are in good order for wintering. The first matter for attention is that of stores, which, as already indicated, should be abundant: the second that of the queen's condition. After these two important matters are settled the beekeeper should satisfy himself that his hives are watertight and draught-proof, also that his apiary is well provided with shelter in the form of good hedges or other wind-breaks.

With regard to the queen, autumn is the time when strict attention should be paid to weak and failing queens. None but the best queens should be allowed to go into winter quarters. Poor queens should be destroyed, and either superseded by young and vigorous ones or their colonies united with those of the better queens before the winter sets in. No queen should be tolerated which cannot provide the colony with an abundant supply of young workers before the cold weather arrives. It is quite certain that the queen that goes back in the autumn will be in worse case after the winter, and will not produce enough workers to provide a surplus in the following season, even if she does not fail entirely before the spring or develop into a drone-layer as soon as brood-rearing commences.

—E. A. Earp, Senior Apiary Instructor.

HORTICULTURE.

VEGETABLE-GROWING.

VEGETABLE sowings for the coming month include turnips, spinach, lettuce, early cauliflower, and cabbage, and large white and main-crop onions. Turnips and spinach come into early use, but the remainder form an important contribution to the spring and early summer supplies.

Varieties of lettuce, cauliflower, and cabbage proved suitable to the locality at the season should be selected and sown in seed-beds well prepared and in good heart. The land where they are to be planted out is now probably occupied by peas, beans, or root crops, or in many cases by tomatoes. It should be warm well-drained land, carefully kept free of weeds, as if these are allowed to seed they cause endless work during the moist weather of winter and early spring, when there is little opportunity of destroying them with the hoe. As soon as the present crop is harvested apply a good dressing of manure, and cultivate the land in preparation for the plants, which will then be ready for putting out.

In many districts the main sowing of the all-important onion crop will be made now. Not only the mild large white Italian onions that are so invaluable in spring salads, but in many districts the better-keeping sorts are sown now for planting out in early spring, so that they may be harvested in the dry weather of midsummer and escape the ravages of mildew fungus. It is specially desirable that the land for the seed-bed should be firm and clean of weeds and their seeds. Sow the onion-seed thinly.

When the main celery crop has almost finished its growth it may be cleaned up, removing suckers and dead leaves, and then earthed up for the purpose of blanching the stems. This usually is best done in one or two operations. Choose fine dry weather. Tie the bunches carefully with damp raffia or flax, and make the soil fine and friable before filling it round the plants.

Carefully protect the growth on the asparagus-beds. In exposed windy places it is sometimes worth while putting stakes and a two-ply binder-twine along the leeward side of the bed to prevent the growth being blown over.

The harvesting of potatoes, onions, pumpkins, and other crops will now keep one busy. This is an operation needing great judgment and care, or all the work of growing the crop is heavily discounted. Just as important is the matter of storage and packing. If the store has not had a good spring cleaning it should be well cleaned up now. There is much virtue in the old-fashioned limewash, and more still if a solution of bluestone be added to it. This makes a good dressing for the walls. The floor of a store requires further attention. It should be scrubbed, or carefully raked out and well moistened with some solution such as formalin, 2 parts to 100 of water, or a solution of bluestone, 1 lb. to 25 gallons water. Quite often the vicinity also will need attention. It is a waste of time selecting produce and then putting it in a store infected with potato-moth, late blight, &c. It will possibly be sold before it goes bad, but buyers soon become aware of the fact that goods from certain stores have a bad knack of

"going off" quickly. A thorough clean-up before the new crop is put away will enable it to be held in condition longer—often a distinct advantage—and raise the reputation of the produce among the buyers. A clean store that is cool and well ventilated will give excellent service.

TOMATO-CULTURE AND ROTATIONAL PRACTICE.

The outside tomato crop will now be well into the harvesting-period. If the plants are at all backward a dressing of soluble fertilizers hoed in when rain is threatening will be of benefit.

The question will soon arise as to the best crop for following on. Too often the ground is neglected for quite a period, which is very undesirable. Much better is it to clean up and burn the old plants and sow a cover-crop, and so get the advantage of the remainder of the growing-season and the considerable amount of manure which remains in the ground. Some growers give the land a good dressing of manure and work the land up for crops of cabbage, lettuce, &c., for early spring cutting. This is a satisfactory succession, except sometimes where a tomato crop is to follow again next season, when the usual heavy manuring again given frequently tells to its disadvantage. The average grower has very generous sentiments as regards expenditure on manures for the land, which is admirable indeed, but evidence is now showing that not only is there an economy but also a benefit to some crops from a more prudent expenditure in this direction.

Regarding the case in question, the cabbage crop probably makes good use of all the manures that are applied, but to follow on with the usual application of fertilizers for the succeeding tomato crop sometimes results in a rank plant that is subject to disease and demands much extra attention. There can rarely be a routine laid down in the matter of applying fertilizers where miscellaneous crops are grown and heavy doses are administered. Careful consideration must be given to the condition of the land from previous dressings and the requirements and peculiarities of the succeeding crop. One of the most urgent problems of the present day in horticulture is to deal effectively and cheaply with land that has been heavily manured and cropped with little or no rotation. To sterilize out the noxious fungi and insect pests is an expensive operation.

One excellent practice observed recently was to sow down the area in tomatoes with grass and clover seed in the month of March, and soon after the plants had finished cropping and had been cleaned up there was an excellent pasture for stock. The property was divided up for this purpose, each section in turn being laid down in grass for three years, giving the land time to recuperate and cleanse itself naturally.

SMALL-FRUITS.

Growers purposing to plant out passion-fruit should sow the seed now, selecting for the seed-bed a piece of good land in a warm, sheltered locality. Thin the seedlings, when they appear, to about 6 in. apart, so that sturdy plants may be available for planting into permanent quarters in the spring.

Some growers of Cape gooseberries prefer to sow seed now, and so have large and early plants for putting out in spring. They will need the protection of a frame during the winter.

Plantings of raspberries, strawberries, currants, &c., will now be completing their growth for the season. Carefully examine the brakes occasionally, and deal with any sign of disease immediately by suitable spraying. Proceed with the preparation of land for new plantings. Remember achievement depends on a good start more than anything else.

THE TOBACCO CROP.

Tobacco crops harvested early will soon be ready for stripping. This stage is reached when the butts of the leaf-stems are well dried out. The plants are then taken from the curing-sticks, and the leaves carefully stripped from them one by one, graded, and tied up into "hands." A hand of tobacco consists of a dozen or so leaves tied together by the stems, the tie used being a tobacco-leaf bound round the stems firmly and the end passed through between the leaves. To do this satisfactorily great care must be taken to have the tobacco in right condition. Generally the dry leaf is brittle, and great damage is done if it is handled then, but if the ventilators are opened up at night or in moist weather the leaf quickly becomes tough and elastic, and the operation of stripping can then proceed.

It is at this stage that the crop is usually marketed in this country, the hands being bulked and afterwards baled up for transport. Otherwise the hands are placed astride of the curing sticks and put back in the shed to await the process of fermentation, which is carried out as the weather warms in spring.

LAWNS AND GREENS.

The warmth and moisture of autumn weather encourages strong growth in lawn-grasses, and those who have the care of playing-greens will now be kept busy cutting and rolling the turf to keep a satisfactory surface. If the turf is poor, applications of manures—liquid or otherwise—at the present time will greatly assist in strengthening the growth. For sowing down new lawns there is no time like the present. The grass comes away rapidly and a good turf is formed before winter, and before weeds have a chance of becoming troublesome. A new lawn disfigured with bad weeds is very disappointing. They may arise from the land not being sufficiently fallowed and cleaned; they may be brought in in the soil used for filling; or they may grow from seed included in the mixture of grass-seeds sown.

—*W. C. Hyde, Horticulturist*

THE HOMESTEAD, ETC., CENTRAL DEVELOPMENT FARM, WERAROA.

ANSWERS TO INQUIRIES.

IN order to ensure reply to questions, correspondents must give their name and address, not necessarily for publication, but as a guarantee of good faith Letters should be addressed to the Editor.

NATURE OF FOOT-ROT IN SHEEP.

J. HUDSON, Waimimi :—

Would you kindly tell me if foot-rot in sheep is a primary infection, and what cocci one would expect to find in the pus from an affected hoof and in the inflamed tissues near the rot?

The Live-stock Division :—

Foot-rot in sheep is generally considered to be a primary infection, caused by the necrosis bacillus, and following injury or some other agency, such as dampness, whereby the organism can gain entrance to its predilection seat. Other organisms at once take advantage of the necrosed tissue to multiply, and, by their toxic action, cause greater inflammatory changes that would otherwise be caused by the primary bacillus above. Any coccal inhabitants of the soil would thus be present, but those most often found are *Staphylococcus aureus* and *S. albus*.

HOME STORAGE OF APPLES.

A. E. KEMP, Cape Runaway :—

In regard to storing apples for home use, should the fruit be dead-ripe on the trees or will they keep longer if picked just before they are quite ripe? I am proposing to build an apple-house in a shady plantation—a roof with fairly wide eaves, open sides (wire netting), and shelves with straw on, over, and under the apples. Could you tell me any better way of storing apples for the winter?

The Horticulture Division :—

For such storage as you suggest apples require to be quite ripe, but should be picked as soon as that stage is reached. If picked on the green side they are inclined to shrivel. Building the store in an evergreen plantation is a great advantage for the natural insulation and coolness it affords. Spreading apples on shelves with straw for storage is little practised here now, the usual method being to carefully grade out the sound fruit into standard bushel fruit-cases (benzine-cases will do) till they are about three parts full, and then stack them in the store up to about six cases high. Many varieties of apples keep well in this way until the average temperature commences to rise in spring.

CONTROL OF ST. JOHN'S WORT.

"ST. JOHN," Urenui :—

Will you kindly give me some information on St. John's wort? I have a paddock which has got away in this weed. It has been cut but seems to come away stronger again from the roots. It has been heavily stocked with both sheep and cattle. I heard of salt being a good thing, but tried it on a small patch without effect. The paddock cannot be ploughed.

The Live-stock Division (Noxious-weeds Inspection) :—

This creeping weed, which is a perennial, is difficult to eradicate on rough unploughable land, as its roots are deeply penetrating, and form runners from which new growth springs up. Where land can be cultivated, deep ploughing, followed by a crop such as potatoes, turnips, or the like, for two years is considered the most effective method of eradication. In unploughable land probably the only method is to keep it cut and thus prevent it seeding. As it is a fairly heavy seeder it should be cut before the seeds are formed. In some of the drier parts of the Dominion, where the land is stocked solely with sheep, there is little or no trouble with the plant, except on roadsides, as the sheep keep it well cropped. In your case, where cattle are kept also, and where there is a growth

of pasture throughout the year, the stock probably make no appreciable diminution of the plant. There are other means of control, such as spraying with a strong arsenious weed-destroying mixture, but the cost of this would be prohibitive. There is also a danger of poisoning stock after heavy dressings of a poisonous preparation.

ELDERBERRY WINE.

A. J. BOYDELL, Parkhill :—

Will you kindly inform me if white elderberries can be used for wine-making, and do they make as good wine as the red ones ? If the white variety are suitable, what would be a good colouring-matter to make the wine red ? Would cochineal do ?

The Horticulture Division :—

We have no knowledge of the white elderberry being used for making wine. A mixture of caramel and cochineal would be preferable as a colouring-matter to cochineal alone, which gives a carmine colour. A still better and more stable colour could be obtained by mixing a sufficient proportion, for the depth of colour required, of the ordinary elderberries (*Sambucus nigra*) with the white berries.

FLEAS ABOUT OUTHOUSES.

"SUBSCRIBER," Papanui :—

Can you tell me how to get rid of fleas about sheds, fowl-runs, &c. ? I have just bought a place with buildings which have been up some years, though they are in good order. There are large numbers of fleas about somewhere, and I think they must be in the dust of the fowlhouse and sheds.

The Live-stock Division :—

Fleas do not thrive in clean places, but only in corners, &c., where dust and dirt collect. It will therefore be necessary to thoroughly clean up the fowlhouses and sheds (including all corners and cracks) by thoroughly sweeping all walls, floors, &c., and burning or disinfecting and burying all sweepings. After this has been done you should thoroughly limewash the buildings with a wash to which from 1 to 2 per cent. of crude carbolic or one of the standard disinfectants has been added. If it is not convenient to limewash, the buildings should be thoroughly sprayed with a 2½-per-cent. solution of any of the disinfectants. The following has also been found satisfactory as a spray for such purposes : Soft (potash) soap, 5 per cent. ; cyllin, 2 per cent. ; kerosene, 2 per cent. ; water, 91 per cent. ; applied with a spray-pump or mop. If you keep fowls it would be advisable to make a sand-bath for them composed of about 4 parts of sublimed sulphur to 96 parts of sand.

SMOTHER-CROP FOR CALIFORNIAN THISTLE.

"SETTLER," Raetihi :—

I have been informed that if cow-grass is sown on land infested with Californian thistle (after ploughing) the thistle will disappear or be choked out by the cow-grass. Could you tell me if this is correct ?

The Fields Division :—

Cow-grass will not choke out Californian thistle or control it to any extent. In districts where lucerne grows well this plant is frequently sown on Californian-thistle areas as a means of control. The heavy growth and the frequent cuttings combine to suppress the thistle.

KAITANGATA COAL-ASHES FOR THE GARDEN.

A. F. MCPHERSON, Christchurch :—

Would you kindly let me know if Kaitangata coal-ashes are of any use to mix with garden-soil ?

The Horticulture Division :—

Coal contains 1 or 2 per cent. of nitrogen, a valuable fertilizer. In ordinary burning it escapes up the chimney, although most of it can be reclaimed in the soot, which forms a valuable dressing for the land. In gasworks, where coal is cooked in an oven (retort), the nitrogen is saved and separated out from the coal-gas, and this is sold to the farmer as sulphate of ammonia. Coal-ashes, where properly burnt, contain only very slight traces of useful fertilizers, being composed chiefly of lime and silica—materials of benefit only to very stiff land, and then only in moderate quantities. Lignites, such as Kaitangata, have a large proportion of sulphate of lime in the ash ; an analysis shows 30 per cent. Such ash applied to soils when fresh is injurious to plants, and should first be exposed to the atmosphere and allowed to oxidize.

TWIN HEIFER RETURNING TO BULL.

F. H., Takapau :—

I have twin heifers, a year old, from a cow at her first calving. They were recently put to the bull and one of them comes back every few days. Can you tell me the significance of this ? Is she probably barren, and are twin heifers often infertile ? Both heifers are of a very feminine type, with well-developed udders.

The Live-stock Division :—

Twin heifers are not as a rule infertile. Infertility, however, often exists in the case of twin calves of different sex. With regard to the trouble you are experiencing with one of your heifers, we would advise obtaining the services of a local veterinary surgeon.

CATTLE-TICK CONTROL IN WAITARA DISTRICT.

FOLLOWING the recent discovery of cattle-ticks at Waitara, Taranaki, the area of land defined as follows has been declared an infected place from which no stock, fodder, or fittings may be removed except under the direction of an Inspector of Stock :—

" All that area bounded by a line commencing at the sea at the mouth of the Waiongona River, following that river to the bridge on the Devon Road ; thence by that road to its junction with the Waitara Road ; thence by that road in a south-easterly direction to its junction with the Pennington Road ; thence along that road to corner of Section 35 ; thence along the south-eastern boundary of Sections 35 and 36 to the Waitara River, across that river to the Waipapa Road ; thence along that road to Elliott Road ; thence by the south-western boundary of Subsection 2 of Section 41 ; thence by the southern boundary of Section 97 to the Nikorima Road ; thence in a northerly direction along that road to the sea, and thence by seashore to mouth of the Waiongona River."

HONEY-CONTROL BOARD.

FOLLOWING the bringing into operation of the Honey-export Control Act, Messrs. John Rentoul, Auckland, and Robert Gibb, Menzies Ferry, have been appointed producers' representatives on the New Zealand Honey-control Board. Mr. Thomas Edwin Clark has been appointed as Government representative on the Board.

Top-dressing after Hay-harvest.—Where hay has been cut from a young or weak turf, 2 cwt. to 3 cwt. of superphosphate can subsequently be applied with advantage as soon as a good fall of rain appears imminent.

WEATHER RECORDS: JANUARY, 1925.

Dominion Meteorological Office.

GENERAL SUMMARY.

RAINFALL was general from the 25th to the 27th, owing to an ex-tropical disturbance passing over the North Island, and some heavy rainfalls were also experienced about the 12th. On the whole, however, the month was rather dry; with the exception of Hawke's Bay, certain Canterbury districts, and the eastern parts of Wellington, the total monthly rainfalls were below the average. The rainfalls about the 26th were most beneficial, and relieved a rather trying time for farmers and graziers in many parts of the country. The weather was remarkably dry in parts of Otago. The last ten days of the month were very unsettled, especially in the northern and east-coast districts; for example, at Maraehako Station, near Opotiki, it rained every day from the 21st to the close of the month, the total rainfall for this period being 8·79 in., of which 2·60 in. and 2·98 in. fell on the 25th and 26th respectively.

Mean temperatures were above the average, but there were cold snaps about the 11th, 17th, and 26th, which did some damage.

Barometric pressure was rather higher than usual, and, though subject to frequent changes, fluctuations were not extreme.

The winds were moderate for the greater part of the month, and the skies rather more cloudy than might have been expected considering the small number of rainy days.

D. C. Bates, Director.

RAINFALL FOR JANUARY, 1925, AT REPRESENTATIVE STATIONS.

Station.	Total Fall.	Number of Wet Days.	Maximum Fall.	Average January Rainfall.
North Island.				
	Inches.		Inches.	Inches.
Kaitaia	3·50	8	1·53	3·36
Russell	1·69	8	0·62	4·54
Whangarei	0·92	8	0·29	3·63
Auckland	2·12	10	0·71	2·59
Hamilton	2·92	6	1·14	3·70
Kawhia	3·56	5	1·30	3·37
New Plymouth	1·48	6	0·65	4·32
Inglewood (Riversdale)	7·01	6	2.41	7·43
Whangamomona	3·31	7	1·63	5·82
Tairua, Thames	3·03	10	0·96	4·12
Tauranga	2·70	10	0·57	4·40
Maraehako Station, Opotiki ..	11·16	16	2·98	2·87
Gisborne	3·38	15	0·80	2·77
Taupo	5·02	9	1·92	3·46
Napier	2·87	13	0·77	2·44
Maraekakaho Station, Hastings ..	3·00	14	0·75	2·29
Taihape	3·60	13	1.38	3·03
Masterton	2·86	10	1·43	2·62
Patea	1·63	7	0·75	3·38
Wanganui	2·16	3	1·20	2·84
Foxton	2·84	5	1·40	1·99
Wellington	3·74	9	1·72	3·32
South Island.				
Westport	4·78	10	2·06	6·80
Greymouth	3·40	6	1·50	9·04
Hokitika	4·73	7	2·76	9·87
Arthur's Pass	5·58	6	4·60	6·75
Okuru, Westland	3·78	8	1·30	12·86

RAINFALL FOR JANUARY, 1925—*continued.*

Station.	Total Fall.	Number of Wet Days.	Maximum Fall.	Average January Rainfall.
South Island—continued.				
	Inches.		Inches.	Inches.
Collingwood	4·69	7	2·34	6·95
Nelson	3·14	9	0·89	2·71
Spring Creek, Blenheim	1·82	7	0·82	2·22
Tophouse	3·26	10	1·16	5·16
Hanmer Springs	3·88	13	1·41	3·30
Highfield, Waiau	3·55	10	1·32	2·84
Gore Bay	2·54	10	0·63	2·47
Christchurch	2·18	7	0·90	2·15
Timaru	1·08	9	0·48	2·28
Ladbrook Station, Fairlie ..	1·70	7	0·80	2·34
Benmore Station, Omarama ..	1·69	5	1·02	2·66
Oamaru	0·71	6	0·20	2·15
Queenstown	0·22	2	0·17	2·71
Clyde	0·84	4	0·20	1·72
Dunedin	1·31	6	0·66	3·41
Gore	0·48	5	0·16	3·34
Invercargill	1·01	12	0·28	4·14

WOOL INDUSTRY REGULATIONS AND COMMITTEE.

THE Board of Trade Wool Industry Regulations of 1921 were revoked last month by Order in Council and new regulations substituted, the main provisions of which are as follows: The Minister of Agriculture may appoint a Committee, to be known as the New Zealand Wool Committee, consisting of a Chairman (who shall be a producer), two representatives of wool-brokers, two representatives of wool-growers, and such other persons as he may from time to time decide, to hold office during his pleasure. At any meeting of such Committee three shall form a quorum. The Committee may from time to time determine the maximum aggregate quantities of wool that may be offered for sale by public auction in any period, and may with respect to any specified sale by public auction fix the maximum quantity of wool that may be offered. It shall not be lawful for any person holding a license under the Auctioneers Act to offer wool for sale by public auction, except that he shall have obtained a permit issued by the Committee on behalf of the Board of Trade, and shall have deposited with the Committee an undertaking that he will faithfully adhere to such directions as the Committee may give in writing from time to time to the local Woolbrokers' Association of which he is a member as to the maximum quantity of wool that may be offered at any specified auction sale.

The following Committee has been appointed: W. Perry, Masterton (Chairman); B. E. H. Tripp, Timaru; and R. Silburn, Hunterville (representatives of wool-growers); W. S. Bennett and A. E. Mabin, Wellington (representatives of wool-brokers).

British Market for Peas and Beans.—The following advice was cabled by the High Commissioner, London, on 7th February: *Peas*—Blue: Japanese firmer; ex store quoted at £24 10s. per ton; February–March shipments, £24 17s. 6d.; Dutch ex store, £24. Partridge in poor demand; good English quoted at 55s. to 60s. per 504 lb.; New Zealand, 65s. to 75s.; Tasmanian, 75s. to 82s. 6d. ex store, according to quality. *Beans*—English slow at 45s., to 55s. per 532 lb., according to quality; choice old spring offered up to 65s. Chinese horse spot sold at £10 15s. per ton; forward shipments not being offered.

ESTIMATED YIELDS OF WHEAT AND OATS.

THE following estimated average yields per acre of wheat and oats for the season 1924–25 have been compiled by the Government Statistician from reports furnished by Inspectors of the Department of Agriculture throughout the Dominion, and issued under date 9th February :—

District.	Wheat. Bushels per Acre.	Oats. Bushels per Acre.
North Island	29·98	34·00
Nelson	28·90	29·93
Marlborough	30·16	40·46
Canterbury	31·17	36·61
Otago	27·70	36·87
Southland	30·06	42·90
Average (estimated) for the Dominion, season 1924–25	30·62	38·08
Average (actual) for the Dominion, season 1923–24 ..	24·01	30·27

In accordance with the above estimates, the total yield of wheat for the Dominion should be approximately 5,000,000 bushels, as against an actual yield of 4,174,537 bushels for the season 1923–24.

The percentage of oats threshed for the five seasons ending with 1923–24 was 27·67 of the total area under that crop. Assuming that a similar proportion is threshed this year, the total yield of grain should be approximately 5,000,000 bushels, as against an actual yield of 1,964,511 bushels for the season 1923–24.

IMPORTATION OF FERTILIZERS: DECEMBER QUARTER.

FOLLOWING are the importations of fertilizers into New Zealand for the quarter ended 31st December, 1924 : *Sulphate of Ammonia :* From United Kingdom, 150 tons ; Australia, 163 tons. *Nitrate of Soda :* Australia, 1 ton. *Basic Slag :* United Kingdom. 133 tons ; Belgium, 77 tons. *Bonedust :* India, 600 tons ; Australia, 130 tons. *Chardust :* Australia, 100 tons. *Rock Phosphate and Guano :* United Kingdom, 15 tons ; New Caledonia, 2,087 tons ; Nauru Island, 13,303 tons ; Ocean Island, 5,750 tons. *Phosphate, other :* Egypt, 2,762 tons. *Kainit :* United Kingdom, 200 tons ; France, 50 tons ; Germany, 95 tons. *Superphosphate :* Netherlands, 10 tons *Sulphate of Potash :* United Kingdom, 75 tons ; Germany, 125 tons ; *Potash, other :* United Kingdom, 140 tons ; Germany, 265 tons ; France, 25 tons. *Sulphate of Iron :* United Kingdom, 6 tons ; Australia, 37 tons. *Miscellaneous :* United Kingdom, 1 ton ; Canada, 2 tons.

FORTHCOMING AGRICULTURAL SHOWS.

Waiapu P. and I. Association : Ruatorea, 25th and 26th February.
North Kaipara Agricultural Association : Paparoa, 26th February.
Tauranga A. and P. Association : Tauranga, 26th February.
Franklin A. and P. Association : Pukekohe, 27th and 28th February.
Omaha and Pakiri A. and H. Association : Leigh, 28th February.
Taumarunui A. and P. Association : Taumarunui, 4th March.
Waikato Central A. Association : Cambridge, 4th and 5th March.
Te Puke A. and P. Association : Te Puke, 5th March.
Mangonui A. and P. Association : Kaitaia, 6th and 7th March.
Kumeu District A. and H. Society : Kumeu, 7th March.
Morrinsville A., P., and H. Society : Morrinsville, 11th March.
King-country Central A. and P. Association : Te Kuiti, 12th March.
Matamata A. and P. Association : Matamata, 19th March.
Mayfield A. and P. Association : Mayfield, 21st March.
Methven A. and P. Association : Methven, 26th March.
Katikati A. and P. Society : Katikati, 26th March.
Temuka and Geraldine A. and P. Association : Winchester, 2nd April.
Malvern A. and P. Association : Sheffield, 16th April.